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GEOGRAPHIC PAYMENT AREAS FOR THE MEDICARE FEE SCHEDULE: ALTERNATIVE APPROACHES

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EXECUTIVE SUMMARY

The Medicare Fee Schedule (MFS), which will be implemented January 1, 1992, incorporates a geographic adjustment with two basic elements. The first is the Geographic Practice Cost Index (GPCI), designed to recognize practice cost differences that are outside the physician's control. The second is the type of area to which the index is applied. The geographic areas currently used for physician reimbursement are called Medicare pricing localities, which are not based on one consistent set of principles across states.

This report presents policy alternatives to the current set of Medicare pricing localities for possible use in the MFS. The task is complicated by Congress' intent to provide a 10-percent bonus to attract physicians to Health Manpower Shortage Areas (HMSAs), introducing a second type of geographic objective. Thus, the problem of defining geographic areas for use in the MFS requires consideration of geographic differences in both practice costs and physician supply.

An ideal system would track practice costs well across areas, would involve a minimum number of adjacent areas with large differences in fee adjustments, would allow for adjustments related to physician supply, and would be conceptually and administratively simple. Since no single system can satisfy all these criteria equally well, choice of system involves tradeoffs.

The report concludes that population density is a reasonable basis for making Medicare physician fee adjustments. Within urban areas, high population densities are associated with high practice costs. Within rural areas, very low densities are associated with low physician availability. Therefore, a geographic system that identifies both high-density urban and low-density rural areas can accomplish the goals of the fee adjustments.

Weaknesses of Current Geographic Area Designations

Medicare pricing localities, the present areas for making adjustments for practice cost differences, have the advantage of administrative familiarity. However, since they were established by Medicare carriers for determining prevailing charges, the principles used to define them vary from carrier to carrier. They imperfectly track true practice cost differences and they often are not consistent with political or economic boundaries—making them hard to justify conceptually or politically.

Although the Health Manpower Shortage Areas are conceptually simple, they are difficult to administer and are difficult to justify as a basis for payment adjustment. They are designated by the Public Health Service according to the number of primary care physicians currently in the area. This makes them unstable, because when successful in attracting physicians to these areas, bonus payments could cause the designation to be lost, leaving HCFA in the position of reducing payments to physicians in some areas that recently had shortages. In 1978, HMSAs became a criterion for grants to community health centers; in 1980, HMSAs were dropped as a criterion for these grants because of instability. Ideally the geographic area definitions for bonus payments should capture the innate difficulty of attracting physicians, regardless of the number of physicians in an area at a given time.

Developing Density-Based Measures of Urban Core

Conceptually, an urban core is the most urban section of a metropolitan area and a suburban ring is the less urban section surrounding the core. Spatial economics indicates that practice costs are higher in the urban core

than in the suburban ring. Chapter IV analyzes two price proxies used in the GPCI—the earnings of occupations employed by physicians and of professionals other than physicians—supporting the hypothesis of higher practice costs in the core.

This report uses the county as the basic building block for defining urban cores. More specifically, urban cores are the most densely populated county in a metropolitan area plus other counties exceeding a certain population density.[1] Cores are identified within each Consolidated Metropolitan Statistical Area (CMSA), which the Census Bureau defines as a metropolitan area of more than one million inhabitants that is subdivided into Primary Metropolitan Statistical Areas (PMSAs). This report expands the definition of CMSA to include those metropolitan areas that have more than one million inhabitants but which have not been subdivided by the Census.

A framework is offered that allows cores to be delineated by selecting two thresholds. The first is the total population of the CMSA needed to qualify for identification of an urban core. The second is the density threshold for the county within the CMSA to be included in the core. The implications of different density thresholds are laid out in terms of numbers of payment areas, percentages of Medicare beneficiaries covered, and percentages of Medicare physician charges covered in 1987.

At a CMSA population threshold of 3 million and a county density threshold of 6,000 persons per square mile, for example, 11 CMSAs would be designated as

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1. Population density is calculated initially at the zip-code level. Then the average population density in the county is calculated by weighting each zip code in the county by the population living in that zip code. This yields a measure of the density experienced by the average person in the county, and takes account of the fact that some counties may have large unpopulated areas but still have high population densities in the areas where most of the county's residents live—and most physicians practice.

having an urban core, and 10 states would be subdivided. Lowering the population threshold improves the ability of the system to track cost differences, but it increases its administrative complexity. It also would lower the payment rate for the remaining areas.

Developing Density-Based Physician Scarcity Areas

The debate on payment levels in rural areas has usually accepted rural areas as an undifferentiated whole, ignoring the great heterogeneity among rural areas in terms of population density. Differentiating among rural areas may refine the debate.

A density-based definition of geographic areas is a reasonable approach for designating bonus payments, because low-density rural areas tend to be farthest from the metropolitan areas, which physicians prefer. Like the urban adjustment areas described above, such a bonus area would be county-based. However, these bonus areas would consist of groups of contiguous counties with densities below a certain threshold.

Density thresholds at 6, 20, and 35 persons per square mile are considered. At 6 persons per square mile, the add-on payments would cover only 1 percent of Medicare beneficiaries and only 0.2 percent of physician charges, and would be limited to the Rocky Mountain region and Alaska. At 20 persons per square mile, the add-on payments would cover 4.8 percent of beneficiaries and 1.3 percent of physician charges, and would add parts of the western Great Plains to the bonus area. At 35 persons per square mile, the add-on payments would cover 9.9 percent of beneficiaries and 3.0 percent of physician charges, and would add much of the eastern part of the Great Plains and sections of the Southeast and northern New England to the bonus area.

Policy Options

Policy options for both urban and rural adjustment thresholds are discussed. The rural threshold is more straightforward and is dealt with first.

Rural Adjustment. A density threshold of 35 persons per square mile seems a reasonable option for the physician scarcity bonus. It is not unlike the bonus payment made by Canadian provinces such as Quebec and Manitoba. Raising the threshold would rapidly increase the area covered, weakening the rational for making cost distinctions among rural areas.

Urban Adjustment. Several options are presented for a possible urban payment adjustment. The policy choice depends, in part, on how much complexity policymakers are willing to accept in exchange for other advantages. Ease of administration, although not key in the immediate future, could become quite important were Congress to apply volume performance standards to the state level. Because controlling volume will remain a key Medicare issue in the future, simplicity is a major concern.

Data in chapter IV indicate that practice costs are substantially higher in the cores of large metropolitan areas than the national average. When the GPCI is implemented through the current Medicare pricing localities, Medicare payment to physicians in the cores of several large metropolitan areas will fall. If statewide payment areas are substituted for the pricing localities, there will be even greater redistribution of physician payments from urban cores. Such redistribution could reduce the willingness of physicians to take Medicare patients in these areas over the longer term.

Three plausible options are presented in the event that policymakers are willing to recognize state subdivisions for the GPCI. The number of payment areas under the status quo and these options are as follows:

Option	Number of Total Areas Total	Statewide
Status Quo	240	16
Large MSAs	94	23
All CMSAs	89	24
Large CMSAs	63	40

(The District of Columbia and Puerto Rico are excluded from the statewide figures.)

Each option has advantages and disadvantages. Basing the system on large (over a million population) Metropolitan Statistical Areas (MSAs) has the advantage of familiarity because that is the unit used for Medicare payment to hospitals. Within an MSA, physician fees would be the same in the suburban ring and the urban core, even though input prices are usually lower in the ring than in the core.

Basing the system on the urban cores in all CMSAs has the advantages of being less complex and of restricting the adjustment to the highest-cost urban areas. Its disadvantage is that both policymakers and physicians are unfamiliar with CMSAs, as distinct from MSAs.

Basing the system on large CMSAs (those with more than 3 million population) is the simplest way to recognize urban cores within states. It is also true that practice costs are substantially higher in these cores than in the remainder of the CMSAs or in the cores of other CMSAs. This suggests that the large-CMSA option does a better job of distinguishing areas with high practice costs than options with more areas and more complexity. The primary

disadvantages, as with the second option, are the lack of policymaker and physician familiarity with the CMSA as a concept, and the ignoring of differences in the cost of practice among MSAs of various sizes and rural areas.

The federal government has begun recognizing geographic differences in wages when paying its employees, and the implications of physician payment reform for high-cost areas are becoming understood. PPS has already been faced with pressure to modify the payment mechanism to deal with high-wage areas. Over the long term, the choice could be between systematic recognition of areas with high practice costs and piecemeal recognition under pressure. The latter is unlikely to yield a conceptually or politically defensible set of adjustments.

Combining Medicare Pricing Localities to Approximate Urban Cores

Because of the administrative complexity of implementing physician payment reform, it might be preferable to build up a configuration of geographic areas that approximates a density-based set of areas by using the existing Medicare pricing localities as building blocks. Doing this at first does not preclude eventual implementation of a fully density-based system. The report ends by aggregating pricing localities to approximate an urban core system that defines cores for each CMSA that includes the densest county plus other counties with densities of about 6,000 persons per square mile. Cores are excluded if they do not have higher GPCIs than the residual areas of their state. When a locality falls completely within the urban core, it is included. When it falls completely outside, it is excluded. When a locality overlaps two urban cores, it is allocated to the core in which the majority of its population falls.

The entire combination process yields 74 payment areas instead of the 240 that now exist. There are 12 areas that would have reductions in GPCI values of more than 4 percentage points compared to the status quo, and 12 that would have increases of more than 4 percentage points. In general, combination causes the GPCI to decrease in the suburbs of large metropolitan areas and increase in rural areas.

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I. INTRODUCTION

The Medicare Fee Schedule (MFS), which will be implemented January 1, 1992, incorporates a geographic adjustment that has two basic elements. The first is the Geographic Practice Cost Index (GPCI), developed by The Urban Institute and the Center for Health Economics Research (Welch, Zuckerman, and Pope 1989). The GPCI is designed to recognize geographic differences in practice costs that are outside the physician's control. It incorporates differences in employee wages, office rents, and malpractice premiums, and one-quarter of the variation in physician time costs.

The second element in the geographic adjustment is the type of area to which the index is applied. The geographic areas currently used to calculate physician reimbursement are called Medicare pricing localities. They were established by Medicare carriers for the purpose of determining prevailing charges as part of the "customary, prevailing, and reasonable" payment methodology. The principles used to define localities vary not only from carrier to carrier but also, within carriers, from service to service. This report presents policy alternatives to the Medicare pricing locality as the geographic unit in the MFS. (Congress mandated that the Physician Payment Review Commission study the locality and potential alternatives as geographic units in the MFS.)[1]

Defining a geographic unit that is analytically defensible, easily understood, and easily implemented is a complex task. It is complicated by

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1. OBRA 1989 P.L. 101-239. Section 6102(d) Studies. (5)(c). This mandates a study of which geographic units would be the most appropriate for measuring and adjusting practice costs and malpractice costs.

Congress's concern that physicians be given an incentive to practice in areas where the supply of physicians is currently low. As part of the legislation that implemented the MFS, Congress stipulated that physicians who practice in Health Manpower Shortage Areas (HMSAs) be given a bonus of 10 percent of their fees.[2]

Thus, the problem of defining a geographic area for use in the MFS requires consideration of geographic differences in both practice costs and physician supply. The "geographic adjustment factor," as the term is used in this report, is the sum of the GPCIs and any bonus payment. Note that at a more technical level, that is, as defined in OBRA 1989, "geographic adjustment factor" does not incorporate bonus payments.

We define several sets of geographic areas that could be incorporated in the MFS and conclude that population density may be a dimension along which to divide areas. Within rural areas, very low population densities are typically associated with lower physician availability. Within metropolitan areas, higher population densities are associated with higher practice costs. Low-density rural areas could replace the HMSA as the basis of the rural bonus payment; high-density urban areas could improve the application of the GPCI.[3]

A. Criteria For Defining Areas

Several criteria help in the task of systematically evaluating geographic options.

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2. HMSAs have recently been renamed Health Professional Shortage Areas.

3. Because of the difficulty of analyzing urban HMSAs, they are not addressed in this report.

First, the GPCI should track the true differences in cost of practice across areas. The present form of the GPCI assumes that input prices vary among metropolitan areas but are constant within a metropolitan area, except for malpractice expenses, which can vary by county.[4] However, substantial work in spatial economics suggests that rents and wages vary systematically within metropolitan areas. The standard spatial economics model assumes a metropolitan area with a single center, where population density is highest and where jobs are disproportionately located. In such a model, rent and wages are theorized to decrease with distance from the center, because workers in the center must be paid more to compensate them either for the longer commute from lower density areas or for the higher rents in the urban core. There is substantial evidence that rents decrease with distance from the center (Ball, 1973) and some evidence that wages decrease with distance (Ebert, 1981; Madden, 1985); hospital wages, in particular, follow this pattern (Hendricks, 1989).[5] A second pattern is that wages tend to be higher in large metropolitan areas than in small ones, controlling for occupational mix and region (Hoover and Giarratani, 1985).

Second, adjustments that are not strictly related to practice costs should be possible to enable policymakers to mitigate structural problems (such as physician shortages) with bonus payments.

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4. Limitations of price data by sites within a metropolitan area necessitated this assumption.

5. This pattern of wages was noted by Adam Smith (1776): "But the wages of labour in a great town and its neighbourhood are frequently a fourth or a fifth part, twenty or five-and-twenty per cent higher than at a few miles distance. Eighteen pence a day may be reckoned the common price of labour in London and its neighbourhood. At a few miles distance it falls to fourteen and fifteen pence. Ten pence may be reckoned its price in Edinburgh and its neighbourhood. At a few miles distance it falls to eight pence. . . ."

Third, differences between geographic adjustment factors at area boundaries should not be excessive. In addition, boundaries should be few in number. Boundaries are an unavoidable consequence of establishing geographic payment areas, but they invite comparisons between contiguous areas, and may result in incentives for physicians to treat patients on one side of a boundary instead of on the other. Boundary problems are more acute in metropolitan areas than in rural areas, simply because more physicians are likely to be closer to the boundary. The Prospective Payment System (PPS), for example, faced political disputes over boundaries, typically urban-rural boundaries. The urban differential in PPS is the result of the hospital wage index—which by itself has substantially more variance than the GPCI—and the urban-rural differential in standardized amounts.

The fourth criterion is conceptual simplicity, which facilitates intelligent discussion and evaluation of policy options. It is also important to help the new policy gain acceptance when implemented.

The final criterion is administrative simplicity. HCFA must be able to identify claims by area so that the proper geographic adjustments can be applied and payments processed without inordinate delays or errors. Administrative simplicity becomes more important if Medicare volume performance standards are ever applied to specific areas. Under current law, the volume of services that physicians bill Medicare must not increase faster than a predetermined rate, called a volume performance standard (VPS). If physicians in the country collectively exceed this standard, the annual update for fees paid to all physicians will be lower than otherwise. The cost-containment incentive under a nationwide standard is weak. If the incentives are

strengthened by applying the VPS at, say, the state level, many payment areas within a state will complicate administration.

B. Assessment of the Status Quo

Under current law, the geographic adjustment in Medicare payments to physicians involves a combination of localities (for the cost differences) and HMSAs (for the bonus payments). Because the definitions underlying these two concepts are unrelated, considering how the resulting areas together meet the above criteria is difficult. Considering them separately is adequate for our purposes, however. If neither localities nor HMSAs satisfy the criteria very well, we can conclude that their combination is also unlikely to do very well.

Localities. The only criterion on which localities score well is administrative simplicity. Carriers have been varying payments based on localities since the start of Medicare. But localities do not always reflect the cost-of-practice differences faced by physicians because they are not conceptually consistent, much less conceptually simple. They are not designed to pinpoint physician shortage areas. Finally, localities involve more boundaries than necessary for any payment purpose. Such problems are at least part of the stimulus for the current debate about changing the basis on which physicians are reimbursed.

HMSAs. HMSAs are defined by the Public Health Service as the physician shortage areas to which members of the National Health Service Corps can be sent to practice. As such, they satisfy the criterion of conceptual simplicity, and they satisfy the criterion of responsiveness to the structural problem of physician shortages. However, they have a number of problems. (OTA [1990, 350-351] mentions several of these problems.)

First, HMSAs are difficult to administer. HMSAs in urban areas are often defined in terms of census tracts. Based on HCFA-developed maps, physicians must determine which of their service sites are in HMSAs. Initial evidence on carrier implementation of the bonus payments is not encouraging. In 1989, the first year, Medicare paid out less than $3 million in bonus payments to physicians in rural HMSAs (HCFA, BPO, 1990). Even if one ignores counties that are only partly in an HMSA, payment to physicians in all levels of rural HMSAs would have resulted in $11 million in bonuses.[6]

Second, although the difference in currently-legislated geographic adjustment factors at HMSA boundaries is not excessive (10 percent), there are large number of boundaries, many of which are not familiar to the general public. For instance, county boundaries are familiar; Census tract boundaries are not. Potentially, many physicians have the opportunity to increase their payment by moving their site of service a few miles. Alternatively, many may complain about the payment differentials within short distances.

Third, updating HMSA designation may be another source of controversy. The list of HMSAs is updated every year, taking into account primarily the number of physicians per person in the area. Thus, every year some areas may lose their HMSA designation and others gain it. In 1990, for example, 36 states had one or more geographic area lose the HMSA designation (Federal Register, 1990). Under current law the Medicare payment to physicians falls when the HMSA designation is withdrawn. At that point, HCFA may have to explain to physicians the decisions made by the Public Health Service.

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6. The 1987 BMAD Provider File was aggregated to the county level, and payments to providers in counties that are entirely in an HMSA were summed. Levels 3 and 4 HMSAs, which were ineligible for bonuses in 1989, are two-fifths of HMSAs. The analysis does not distinguish HMSAs by level.

Fourth, using HMSAs as a payment area could lead to cyclical swings in payment levels: When an area receives an HMSA designation, physicians might move into the area, causing the area to lose its designation. In at least one instance, a physician left an area when the bonus was withdrawn (OTA, 1990, 351). As a policy incentive, the bonus could vary by the innate difficulty of attracting physicians, irrespective of the number of physicians in the area at a given time. In other words, it could be designed to attract and retain physicians in areas that would otherwise be shortage areas.

A bit of history of HMSA is instructive. In 1978, community health centers could qualify for grants if they were located in a HMSA. However, "in 1980, these policies were repealed because HMSA designations were considered to be unstable and overly dependent on small changes in numbers of physicians or local population characteristics." (OTA, 1990, 291) This experience does not bode well for Medicare's use of HMSAs.

C. Payment Area Options

In identifying payment area options that could replace the status quo, we begin with the state as a well-defined and easy to understand geographic division, and then separate out high-cost urban areas in several ways. Under each alternative, those parts of the state not singled out for an urban adjustment are treated as one unit. (We deal with the physician shortage bonus in a separate step, by defining a set of "very rural areas"—i.e., low-density rural areas—to receive the 10 percent bonus currently given to HMSAs. See Chapter III.)

Statewide Option. No urban area is distinguished—52 payment areas.

All-MSA Option. Each MSA is distinguished—about 370 payment areas.

Large-MSA Option. Each MSA with a population of more than one million is distinguished—94 payment areas.

- All-CMSA Option. The high-density core of each Consolidated Metropolitan Statistical Area (CMSA) is distinguished—89 payment areas. Metropolitan areas with more than one million inhabitants may be subdivided by the Census Bureau into primary MSAs (PMSAs). Then the metropolitan area is termed a CMSA, as distinct from a metropolitan area that is not subdivided, called a free-standing MSA. The Census Bureau considers the CMSA to be the basic metropolitan unit, whereas primary MSAs are defined to reflect, in part, "local opinion." (Note that PPS' use of "MSAs" involves Primary MSAs, not Consolidated MSAs.) Whether a large metropolitan area is subdivided has little relevance to the present paper, so we refer to any free-standing MSA with a population over one million as a CMSA.

Large-CMSA Option. The urban core of each CMSA with a population over three million is distinguished—63 payment areas.

In certain contexts, we discuss an option between the last two.

Large- and Medium-CMSA Option. The urban core of each CMSA with a population over two million is distinguished—73 payment areas.

Chapter II discusses the urban options. Chapter III operationally defines the very rural areas that we develop for the bonus payment. Chapter IV investigates two price proxies for the areas developed in the two previous chapters. Chapter V calculates GPCI values for the options for urban areas and discusses how well these options meet the criteria we lay out in this chapter. The final chapter explores how a CMSA-based option might be easily implemented by combining present localities.

II. URBAN AREA DEFINITIONS FOR THE GPCI

This chapter considers the implications of using the MSA as the geographic unit for the GPCI (MSA-based options). It then develops the two measures of urban core (CMSA-based options).

A. Basing the GPCI on MSAs

Our earlier work developed a GPCI based on the MSA (Welch, Zuckerman, and Pope, 1989). The MSA has the advantage of familiarity because it is already used as the geographic unit for cost adjustment in Medicare's PPS system for hospital payment. Compared with the pricing locality, it has the advantage of standardization.

Table II-1 shows several characteristics of MSA-based payment areas. Under both MSA-based options, for example, at least 40 percent of the elderly population (our proxy for the Medicare beneficiary) and more than half the total Medicare physician charges would be in the urban payment areas. There would also be substantial administrative complexity. The all-MSA option, for example, would use about 320 MSAs. There would be no unadjusted statewide payment areas because even the most rural state has at least one MSA.

The large-MSA option cuts down the complexity considerably in that it yields a total of 43 MSAs. However, more than half the states would have multiple adjustment areas, often resulting in geographic oddities. For example, Wisconsin would be divided into three payment areas: the Milwaukee MSA, St. Croix County (a suburb of Minneapolis-St. Paul), and the rest of the state. South Carolina would be subdivided into two areas: York County (a suburb of Charlotte, North Carolina) and the rest of the state. Indiana and

Kentucky would have similar "dangling" areas. Finally, the one million population cutoff would have the anomalous effect of excluding the Jersey City MSA from any urban adjustment. Situated between Manhattan and Newark, Jersey City is urban by almost any definition.

A higher population threshold would reduce the complexity of the system, but would increase the number of anomalies. A threshold of two million, for example, would exclude the PMSAs of Newark and San Francisco, even though their core counties are two of the three most densely populated counties in the country outside of New York City.[7] Because of these problems with an MSA-based GPCI definition, the next section discusses alternative definitions based on urban cores.

B. Basing the GPCI on Urban Cores

Conceptually, an urban core is the most urban section of a metropolitan area. It tends to be in the center of an area and usually has a concentration of residents and jobs. It may also be termed the "inner city."

Methodology

Urban cores can be defined in terms of either counties or zip codes. Each approach has its advantages. On the one hand, counties are more familiar to participants in the policymaking process. Use of counties would also avoid the administrative need to respond to any minor changes in zip codes made by the Postal Service. Further, use of counties for the GPCI would be consistent with

7. At a threshold of 2 million, New Jersey would be subdivided into two areas: three counties in the Philadelphia MSA and the rest of the state. Newark and Jersey City would not be differentiated from the semi-rural sections of the state because they are below the 2 million cutoff (New Jersey has no rural counties), but the suburban county of Burlington would be differentiated.

our use of counties to define low-density rural areas in Chapter III. On the other hand, a county may be heterogeneous in terms of density and other characteristics, such that zip code-based urban cores would reflect cost differences more exactly than county-based cores. To the extent that only parts of certain counties might be considered in urban cores, including the entire county risks including too much and excluding it risks excluding too much. Using zip codes avoids such dilemmas but has the disadvantage of being considerably more complex.

Given our desire to avoid complexity, we develop county-based urban cores in this chapter.[8] Zip code-level data, however, are used to define which counties are urban cores.

Five-digit zip code-level data are now available from several private vendors. Businesses are using such data for direct mail and for choice of retail sites, and this type of data will be heavily used in political redistricting. In addition to retail trade data, these data bases have a number of socio-demographic variables, the ultimate source usually being a special tabulation of the 1980 Census. The zip code-level data used here are limited to data on population and land area.

We use zip code-level data from Market Statistics, a data firm based in New York City. Because each year a small proportion of zip codes are modified by the Postal Service, Market Statistics updates its data base annually. The zip code definitions pertain to January 1989 with the exception of Florida. Florida zip codes pertain to July 1989 because a new three-digit zip code was introduced in Tampa in early 1989. In the cases where zip codes cross county

8. For comparison, we develop zip-code-based urban cores in Appendix 1 and discuss the pros and cons of their use.

lines, Market Statistics allocates zip codes to the county according to the largest portion of the population.[9] Population figures are projected from the 1980 Census using county-level population figures from the Current Population Survey.

We define urban cores using population density—the ratio of population to area. Calculated at the county level, however, this measure represents an average density that does not necessarily reflect the density experienced by most of the population. Take the case of San Bernardino, a large county in southern California. Most of its population is in its southwest corner but most of its area is in the Mohave Desert. The county's population density is therefore quite low, even though a majority of its population lives in urban areas.

The conventional measure of population density may be appropriate for some purposes, perhaps environmental analyses. However, health care policy pertains to people and a more appropriate density measure is one that reflects the density for the average person. To capture this concept, we initially calculate density at the zip-code level. Density at the county level is then calculated as an average that is weighted by the zip code's population.[10]

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9. In a similar manner, the Health Care Financing Administration uses zip codes to categorize Medicare beneficiaries by county. Then Medicare payment to HMOs varies by the residence of the beneficiary.

10. The Census Bureau calculates the percentage of a county's population that is urban. Population-weighted density is essentially a generalization of this measure.

More precisely, let A_i and P_i be the area and population of zip code i. Population density weighted by population (D) is:

$$D = [\Sigma_i \ (P_i/A_i)P_i] \ / \ \Sigma_i P_i$$

Note that if area replaces population as the weighting factor, this measure simplifies to:

$$[\Sigma_i \ (P_i/A_i)A_i] \ / \ \Sigma_i A_i = \Sigma_i P_i \ / \ \Sigma_i A_i$$

Thus, the conventional measure of density is implicitly area weighted.[11]

If a county has density that is uniform over zip codes (i.e., P_i/A_i is the same for all zip codes within the county), density weighted by population (D) is the same as density weighted by area. With any other density distribution, weighting by population necessarily increases average density, because the dense zip codes have a greater proportion of the county's population than of its area. The less uniform the density, the more that weighting by population increases the measure of density. Denver has a fairly uniform population density, for example, so its population-weighted density is only 1.3 times its area-weighted density. San Bernardino's population-weighted density, in contrast, is 24 times its area-weighted density.

Urban cores defined in terms of counties probably should have two properties. The cores should include at least one county in each large CMSA,

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11. Just as regression estimates can be unduly influenced by one or two outliers, population-weighted density can be unduly influenced by one or two zip codes, perhaps reflecting anomalies in their boundaries. Consider two contiguous zip codes, each with an area of 1 square mile. The first has 10,000 people, and the second, comprising a park and office buildings, has no people. The weighted density of these 2 zip codes is 10,000. If the two zip codes are combined, however, the weighted density is 5,000. In the few cases where this was a serious problem, the zip code in question was combined with a contiguous zip code before density was calculated.

because wages are a function of CMSA population size as well as county density (see Chapter IV). Many cities in the Sunbelt have grown more recently than cities in the Northeast and hence have lower densities. Second, it should include additional counties in CMSAs whose urban core clearly stretches beyond a single county. In particular, the counties in the New York CMSA that include Newark and Jersey City are archetypically urban core, as are the counties in the San Francisco CMSA that include San Francisco and Oakland. To be responsive to the intent of the definition, any urban core definition probably should capture all four of these counties.

One possible definition of urban core would be all counties exceeding a certain density (weighted by population). The problem with this definition is that some large urban cores are not represented. A threshold of 4,000 persons per square mile, for example, would include about 50 counties but not Dallas, Houston, and Atlanta, which are in the 15 largest CMSAs. To ensure that each CMSA above a population size threshold is represented, we take the approach of defining urban cores to include the most densely populated county in each CMSA (above a population threshold) plus any other counties in the CMSA that exceed a certain density threshold.

The use of CMSAs as the geographic unit is more promising than use of MSAs, with fewer areas and fewer anomalies. Jersey City is included if a CMSA population threshold is one million, for example, and Newark and San Francisco if the threshold is raised to two million. Table II-2 lists all CMSAs (including MSAs with populations over one million that do not happen to be divided into constituent PMSAs). There are 11 CMSAs above 3 million, 10 between 2 and 3 million, and 16 between 1 and 2 million. We develop options using all three thresholds.

In terms of the options in Chapter I, we analyze the following three CMSA policy options:

- — (large-CMSA option) 3 million population and 6,000 persons per square mile,
- — (large- and medium-CMSA option) 2 million population and 3,500 persons per square mile, and
- — (all-CMSA option) 1 million population and 3,500 persons per square mile.

Results

Table II-3 shows the most densely populated counties in the 37 CMSAs with populations exceeding 1 million. Panel A shows CMSAs with populations of at least 3 million, Panel B CMSAs with populations between 2 and 3 million, and Panel C CMSAs with populations between 1 and 2 million. All panels show the effect of reducing the density threshold. This enables us to show the effect of changing one or both of our policy parameters. Lowering the CMSA population threshold moves one down the table; lowering the county density threshold moves one to the right.[12]

The narrowest option, 3 million population and 6,000 persons per square mile, defines cores only for the 11 largest CMSAs, of which only 3 include more than one county in the core. In the San Francisco CMSA, for instance, the core would include only San Francisco and Alameda (Oakland) Counties. This option involves only 24 out of 116 counties in these 11 CMSAs. It captures about half (53 percent) of the physician charges in these CMSAs.

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12. Note that if density was not population weighted, the rankings of counties would change considerably. In the largest CMSAs, for instance, weighting by population increases density by a factor of only 1.5 for several counties: Hudson (1.5), Union (1.4), Nassau (1.4), Middlesex NJ (1.4), and Broward (1.5). But weighting increases density by a factor of more than 3.5 for several other counties: Alameda (3.6), Passaic (3.7), Santa Clara (4.8), and San Mateo (3.6).

This option includes two conspicuous anomalies. Bergen County is excluded but Passaic County, which is farther from New York City, is included. This is because much of Passaic's population is in the densely populated cities of Patterson and Passaic, whereas Bergen's population is distributed more evenly over the county. Middlesex County, Massachusetts, is also excluded, even though Cambridge has a very high density, because the county is so heterogeneous.

To address these anomalies, we decided to lower the population density threshold in the 2 million population option. Lowering it to 5,000 is enough to remove the Bergen and Cambridge anomalies, at the cost in added complexity of 4 additional counties in the over 3 million population group, although none in the 2-3 million population group. This option introduces an additional anomaly for Minneapolis-St. Paul, however. The central business district of this MSA is split by the Mississippi River, which is also the boundary between the Twin Cities (and their associated counties). The urban core of Minneapolis (Hennepin County) is included under the densest county criterion, but the urban core of St. Paul (Ramsey County) is not included. For this reason, the population density threshold for our second option is lowered to 3,500. This change adds 8 counties to the over 3 million population group, but none except Ramsey to the 2-3 million population group. (One might still prefer a density threshold such as 5,000.)

Were the density threshold lowered further, the counties that would be added are not normally thought of as core—for instance, DuPage County in the Chicago CMSA and Adams and Arapahoe Counties in the Denver CMSA. At a threshold of 2,500, most of the population in many CMSAs would be in the core. At that point, an MSA-based option would be more straightforward.

Maps are a useful check on our approach. Map II-1 presents the urban cores between New York City and Washington, D.C. under options involving large and all CMSAs. (The large- and medium-CMSA option and the all-CMSA option are the same in this area of the country.) In the New York City CMSA, going from the large-CMSA option to the large- and medium-CMSA option adds two counties: Bergen in the north (discussed above) and Middlesex in the southwest. In the Philadelphia CMSA, this option adds three counties: Delaware County in the southwest, Camden County in the southeast, and Mercer County (Trenton), which is contiguous to the New York City CMSA but not to Philadelphia County. In the Washington, D.C. MSA, this option adds Montgomery County in the northwest and Falls Church (too small to be visible). Baltimore MSA is included only in the large- and medium-CMSA option.

Table II-4 presents characteristics of urban cores under the three policy options. The CMSA-based options define cores with 16, 26, and 31 percent of the U.S. population. Surprisingly, urban cores defined at the county level do not have disproportionate numbers of the poor. This is because the poverty rate is higher in rural areas than urban ones. However, they are disproportionately black.

Under each option the core captures the same percentages of the elderly as of the general population. The proportion of physician charges under these options is substantially higher—23, 36, and 43 percent. This probably reflects several phenomena: (1) higher allowed charges in urban cores, (2) higher utilization by residents of urban cores, and (3) border crossing.[13] Since major hospitals tend to be in urban cores, beneficiaries in suburban and

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13. Expenditure by residence of the beneficiary is regularly used to compute Medicare payment to HMOs. This is higher in urban cores than can be explained by the prices that Medicare pays (Welch, 1989).

rural areas probably receive more care in the urban core than beneficiaries in urban cores receive elsewhere. The Medicare Fee Schedule will reduce these figures only slightly (CBO, 1990). Since a substantial proportion of physician charges are in these cores, payment cannot be increased substantially to these areas without serious budgetary impacts.

If a core is defined for all CMSAs, 24 states would have statewide payment areas. This is only one more than the 23 states which result if MSAs above one million were used (Table II-1). However, unlike the MSA unit, the area boundaries for the urban cores seldom cross state lines, leaving fewer "dangling" areas—areas that are in the urban adjustment area for payment purposes, but jurisdictionally in another state. If a core is defined only for large CMSAs, 40 states (plus D.C. and Puerto Rico) would have statewide payment areas.

Table II-1

Characteristics of Urban Payment Areas
Based on MSAs

Option	Threshold MSA Population	Number of MSAs	Number of States Subdivided[a]	Percentage of Elderly Population	Percentage of Physician Charges
All-MSA	0 Million	about 320	50	73%	86%
Large-MSA	1 Million	43	27	40	51
—	2 Million	21	15	28	37
—	3 Million	8	10	16	23

a. The District of Columbia and Puerto Rico are excluded from these figures.

Table II-2

Metropolitan Areas with Population Above One Million

Consolidated Metropolitan Statistical Area (CMSA) Primary Metropolitan Statistical Area (PMSA)	1988 Population (000s)
New York-Northern New Jersey-Long Island N.Y.-N.J.-Conn. CMSA	18,120
New York, N.Y. PMSA	8,567
Nassau-Suffolk, N.Y. PMSA	2,639
Newark, N.J. PMSA	1,886
Bergen-Passaic, N.J. PMSA	1,292
Middlesex-Somerset-Hunterdon, N.J. PMSA	987
Monmouth-Ocean, N.J. PMSA	970
Jersey City, N.J. PMSA	542
Bridgeport-Milford, Conn. PMSA	444
Orange County, N.Y. PMSA	294
Stamford, Conn. PMSA	192
Danbury, Conn. PMSA	191
Norwalk, Conn. PMSA	126
Los Angeles-Anaheim-Riverside, Calif. CMSA	13,770
Los Angeles-Long Beach, Calif. PMSA	8,588
Riverside-San Bernardino, Calif. PMSA	2,278
Anaheim-Santa Ana, Calif. PMSA	2,257
Oxnard-Ventura, Calif. PMSA	647
Chicago-Gary-Lake County, Ill.-Ind.-Wis. CMSA	8,181
Chicago, Ill. PMSA	6,216
Gary-Hammond, Ind. PMSA	612
Lake County, Ill. PMSA	495
Jollet, Ill. PMSA	379
Aurora-Elgin, Ill. PMSA	355
Kenosha, Wis. PMSA	123
San Francisco-Oakland-San Jose, Calif. CMSA	6,042
Oakland, Calif. PMSA	2,006
San Francisco, Calif. PMSA	1,590
San Jose, Calif. PMSA	1,432
Vallejo-Fairfield-Napa, Calif. PMSA	421
Santa Rosa-Petaluma, Calif. PMSA	366
Santa Cruz, Calif. PMSA	227
Philadelphia-Wilmington-Trenton, Pa.-N.J.-Del.-Md. CMSA	5,963
Philadelphia, Pa.-N.J. PMSA	4,920
Wilmington, Del.-N.J.-Md. PMSA	574
Trenton, N.J. PMSA	331
Vineland-Millville-Bridgeton, N.J. PMSA	138

Metropolitan Statistical Area	Population
Detroit-Ann Arbor, Mich. CMSA	4,620
Detroit, Mich. PMSA	4,352
Ann Arbor, Mich. PMSA	268
Boston-Lawrence-Salem, Mass.-N.H. CMSA	4,110
Boston, Mass. PMSA	2,845
Lawrence-Haverhill, Mass.-N.H. PMSA	381
Lowell, Mass.-N.H. PMSA	262
Salem-Gloucester, Mass. PMSA	259
Brockton, Mass. PMSA	187
Nashua, N.H. PMSA	177
Dallas-Fort Worth, Tex. CMSA	3,766
Dallas, Tex., PMSA	2,475
Fort Worth-Arlington, Tex. PMSA	1,291
Washington, D.C.-Md.-Va. MSA	3,734
Houston-Galveston-Brazoria, Tex. CMSA	3,642
Houston, Tex. PMSA	3,247
Galveston-Texas City, Tex. PMSA	210
Brazoria, Tex. PMSA	185
Miami-Fort Lauderdale, Fla. CMSA	3,001
Miami-Hialeah, Fla. PMSA	1,814
Fort Lauderdale-Hollywood-Pompano Beach, Fla. PMSA	1,187
Cleveland-Akron-Lorain, Ohio CMSA	2,769
Cleveland, Ohio PMSA	1,845
Akron, Ohio PMSA	654
Lorain-Elyria, Ohio PMSA	271
Atlanta, Ga. MSA	2,737
St. Louis, Mo.-Ill. MSA	2,467
Seattle-Tacoma, Wash. CMSA	2,421
Seattle, Wash. PMSA	1,862
Tacoma, Wash. PMSA	559
Minneapolis-St.Paul, Minn.-Wis., MSA	2,388
San Diego, Calif. MSA	2,370
Baltimore, MD MSA	2,343
Pittsburgh-Beaver Valley, Pa. CMSA	2,284
Pittsburgh, Pa. PMSA	2,094
Beaver County, Pa. PMSA	190

Metropolitan Statistical Area	Population
Phoenix, Ariz. MSA	2,030
Tampa-St.Petersburg-Clearwater, Fla. MSA	1,995
Denver-Boulder, Colo. CMSA	1,858
Denver, Colo. PMSA	1,640
Boulder-Longmont, Colo. PMSA	218
Cincinnati-Hamilton, Ohio-Ky.-Ind. CMSA	1,729
Cincinnati, Ohio-Ky.-Ind. PMSA	1,449
Hamilton-Middletown, Ohio PMSA	280
Kansas City, Mo.-Kans. MSA	1,575
Milwaukee-Racine, Wis. CMSA	1,572
Milwaukee, Wis. PMSA	1,398
Racine, Wis. PMSA	174
Portland-Vancouver, Oreg.-Wash. CMSA	1,414
Portland, Oreg. PMSA	1,188
Vancouver, Wash. PMSA	226
Sacramento, Calif. MSA	1,385
Norfolk-Virginia Beach-Newport News, Va. MSA	1,380
Columbus, Ohio MSA	1,344
San Antonio, Tex. MSA	1,323
New Orleans, La. MSA	1,307
Indianapolis, Ind. MSA	1,237
Buffalo-Niagara Falls, N.Y. CMSA	1,176
Buffalo, N.Y. PMSA	959
Niagara Falls, N.Y. PMSA	217
Providence-Pawtucket-Fall River, R.I.-Mass. CMSA	1,125
Providence, R.I. PMSA	647
Pawtucket-Woonsocket-Attleboro, R.I.-Mass. PMSA	325
Fall River, Mass.-R.I. PMSA	154
Charlotte-Gastonia-Rock Hill, N.C.-S.C MSA	1,112
Hartford-New Britain-Middletown, Conn. CMSA	1,068
Hartford, Conn. PMSA	755
New Britain, Conn. PMSA	148
Middletown, Conn. PMSA	86
Bristol, Conn. PMSA	79
Salt Lake City-Odgen, Utah MSA	1065

SOURCE: Bureau of the Census, Public Information Office, news release, September 8, 1989.

Table II-3

Counties by CMSA and Density

Panel A: CMSAs with Population of at Least 3 Million

CMSA (population in millions)	Densest County (density)	Density (persons/sq. mile) >7500	7500-6000	6000-5000	5000-3500
New York (18.1)	5 boroughs	Hudson (Jersey C) Essex (Newark) Passaic	Westchester Union Nassau	Bergen	Middlesex
Los Angeles (13.8)	Los Angeles (8,800)			Orange	
Chicago (8.2)	Cook (11,400)				
San Francisco (6.0)	San Francisco (23,600)		Alameda (Oakland)	Santa Clara (San Jose)	San Mateo
Philadelphia (6.0)	Philadephia (15,600)			Delaware	Camden Mercer (Trenton)
Detroit (4.6)	Wayne (6,300)				Macomb
Boston (4.1)	Suffolk (15,500)			Middlesex (Cambridge)	
Dallas (3.8)	Dallas (3,400)				
Washington (3.7)	District of Columbia (16,000)	Alexandria	Arlington		Falls Church Montgomery
Houston (3.6)	Harris (3,500)				
Miami (3.0)	Dade (6,400)				Broward (Ft Lauderdale)

NOTE: Density is weighted by zip code population (see text for equation). Parentheses have the principal city of a county.

Table II-3 (continued)
Page 2

Panel B: CMSAs with Population between 2 and 3 Million

CMSA (population in millions)	Densest County (density)	Density (persons/sq. mile) >7500	7500–6000	6000–5000	5000–3500
Cleveland (2.8)	Cuyahoga (5,400)				
Atlanta (2.7)	Fulton (2,800)				
St. Louis (2.5)	St. Louis City (8,400)				
Seattle (2.4)	King (4,100)				
Minneapolis (2.4)	Hennepin (4,400)				Ramsey (St. Paul)
San Diego (2.4)	San Diego (4,100)				
Baltimore (2.3)	Baltimore City (10,900)				
Pittsburgh (2.3)	Allegheny (4,500)				
Phoenix (2.0)	Maricopa (3,900)				
Tampa (2.0)	Pinellas (St. Petersburg) (3,700)				

Table II-3 (continued)
Page 3

Panel C: CMSAs with Population between 1 and 2 Million

CMSA (population in millions)	Densest County (density)	Density (persons/sq. mile) >7500	7500-6000	6000-5000	5000-3500
Denver (1.9)	Denver (5,800)				
Cincinnati (1.7)	Hamilton (4,100)				
Kansas City (1.6)	Jackson (3,200)				
Milwaukee (1.6)	Milwaukee (6,100)				
Portland, OR (1.4)	Multnomah (4,000)				
Sacramento (1.4)	Sacramento (4,000)				
Norfolk (1.4)	Norfolk City (6,700)				Portsmouth
Columbus, OH (1.3)	Franklin (3,600)				
San Antonio (1.3)	Bexar (3,400)				
New Orleans (1.3)	Orleans (8,300)				Jefferson
Indianapolis (1.2)	Marion (3,000)				
Buffalo (1.2)	Erie (4,800)				
Providence (1.1)	Providence (5,500)				
Charlotte (1.1)	Mecklenburg (<2,500)				
Hartford (1.1)	Hartford (2,900)				
Salt Lake City (1.1)	Salt Lake (3,200)				

Table II-4

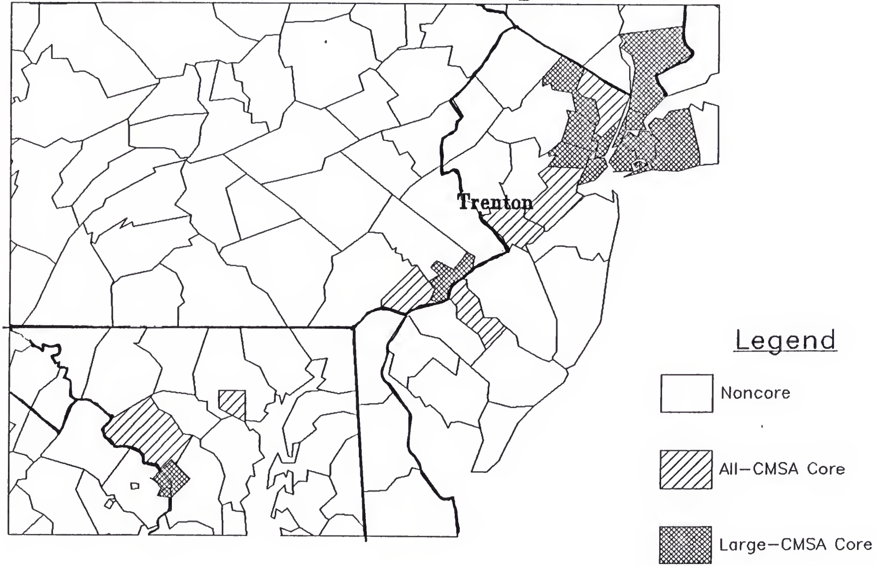
Characteristics of Urban Cores
Based on CMSAs

Option	Threshold: CMSA Population	Threshold: County Density[a]	Number of CMSAs	Number of Payment Areas: Total	Number of Payment Areas: Statewide[b]	Percentage of Population: Total	Percentage of Population: Elderly	Percentage of Population: Poor	Percentage of Population: Black	Percentage of Physician Charges
Large-CMSA	3 Million	6,000	11	63	40	16%	16%	19%	30%	23%
Large- and medium-CMSA	2 Million	3,500	21	73	33	26	26	26	38	36
All-CMSA	1 Million	3,500	37	89	24	31	31	31	45	43

a. Population-weighted density.

b. The District of Columbia and Puerto Rico are excluded from these figures.

Map II - 1. Urban Cores Between New York and Washington, DC



III. RURAL AREA DEFINITIONS FOR BONUS PAYMENTS

The debate on payment levels in rural areas has usually taken Census Bureau-defined nonmetropolitan areas as an undifferentiated whole. There is, however, great heterogeneity among rural areas in terms of population density. We believe that geographic adjustments may better achieve their purpose if a more refined definition than that of the Census Bureau is used.

One concern regarding geographic adjustments is the scarcity of physicians in areas where they are less likely to want to practice. This concern arises because most physicians are reluctant to practice in areas that are so remote that (1) they must travel long distances to medical centers and cultural attractions, (2) they are isolated from colleagues, and (3) their spouses may find it difficult to obtain employment. Presumably this problem is worse in very rural areas than in more densely populated rural areas.

Without judging all the concerns raised on this issue (PPRC, 1990, chapter 7), we differentiate rural areas. The decision of the Congress to incorporate only one-quarter of the variation in physician time costs in the GPCI already helps rural physicians in comparison to their urban counterparts. Adding a density-based definition of very rural areas for payment of the bonus would provide additional compensation.

The current geographic unit designated for the bonus is the Public Health Service's HMSA. As noted above and by OTA (1990), there are conceptual, administrative and political reasons why this is not a good geographic unit for Medicare. To recap briefly, the conceptual reason is that HMSAs reflect current shortages by measuring the number of physicians in an area: When this

number rises, the designation is removed. To provide the correct incentives, Medicare might use a measure of the inherent factors constraining physician supply, in order not only to attract physicians but to keep them there once they are there. The administrative reason is twofold. First, it is problematic to rely on another agency for definition of a Medicare payment unit. Second, many rural HMSAs are sections of counties, complicating administration. The political reason is that designation of HMSAs changes from year to year, such that Medicare will have to cut physician fees in some areas.

A. Using Density to Distinguish Very Rural Areas

The Public Health Service designates as shortage areas those areas with more than 3,500 persons per primary care physician. The area must be a rational area for the delivery of primary care services. It may help in deciding what other area definition might be suitable for the bonus payment by considering the possible reasons for physicians to be in short supply under the HMSA definition.

Two major reasons come to mind. The first is the reason we have already noted, that the area is too far from cultural and labor market centers to be very attractive to physicians. The second is that the area is poor, and that people seek little care because they cannot afford to pay for it and do not have health insurance. Table III-1 shows the distribution of rural counties with an HMSA by population density and poverty status.[14] As can be seen, the poorer and more rural counties are indeed more likely to have an HMSA. For example, 75 percent of counties with population densities of 20 persons or less

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14. The Bureau of Shortage Designations provided a tape describing HMSAs by county. Poverty rates were aggregated from zip-code-level data from Market Statistics.

per square mile and 25 percent or more poverty have HMSAs—compared to only 26 percent of counties with 100 or more persons per square mile and 15 percent or less poverty.[15]

Medicare physician payment bonuses may attract to some areas physicians who would not otherwise go there because of location. However, bonus payments to physicians under Medicare are not well designed to increase the ability of poor people to pay for care. Indeed, one could make an argument that paying physicians bonuses to care for Medicare patients would in fact reduce the supply of physicians for nonelderly poor persons. Physician shortages traceable to lack of ability to pay among the potential patient population are better dealt with directly, perhaps through an expansion of the Medicaid program.

We are not, therefore, pursuing further the idea of a poverty-based definition of bonus areas. It should be noted that the counties with HMSAs that are high poverty but not low-density rural areas are almost exclusively in the South, which is also the region with the highest percentage of persons without health insurance (Moyer, 1989). Many of these areas will in any case experience substantial increases in payment rates under the Medicare Fee Schedule. In rural Alabama, rural Georgia, and rural Louisiana, for example, physician payment rates will increase 22, 24, and 19 percent, respectively (Levy et al., 1990).

Another way to delineate bonus areas, nonadjacency, has different problems. Under this alternative, bonuses would be awarded to physicians practicing in areas that are not adjacent to a MSA. Unlike a poverty-based

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15. Berk, Bernstein, and Taylor (1983) confirm the poverty pattern.

delineation, the nonadjacency notion is intended to measure a conceptually relevant concept—isolation from urban areas and their perquisites—but it does so poorly. Only a small section of an "urban" county may be urbanized and the adjacent county itself may be large. Counties tend to be much larger in the West than elsewhere in the country. As a result, residents of large Western counties may be at a considerable distance from urbanized areas even though their county abuts a metropolitan area.

In addition, any border in common would be considered adjacent, resulting in awkward situations. For instance, Shasta County in northern California (four times the area of Rhode Island) constitutes the small MSA of Redding. Modoc County (also four times the area of Rhode Island) is adjacent to Shasta County, although they have little more than a corner in common. The adjacency criterion would not consider Modoc County rural, even though its population density makes it frontier rural—less than six persons per square mile. The nonadjacency definition would put bonus payments at the mercy of geometric oddities. (The qualities desired for a geographic payment scheme are enumerated in Chapter I. Appendix 2 discusses the merits of other rural typologies in light of these criteria.)

We suggest defining very rural areas for the bonus by population density (conventionally measured) because this is the most fundamental measure of ruralness.[16] In addition, the variables that distinguish very rural areas tend

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16. Although we define urban cores using population-weighted density, we define low-density rural areas using the conventional measure of density. This is because in rural counties, unlike in urban areas, population-weighted density can be dominated by one or two zip codes. Of the counties with densities below 20 persons per square mile, for example, half have five or fewer zip codes. There will be no pressure from rural counties to switch from conventional density to population-weighted density, which would increase the density measure. As long as physicians in low-density rural areas are paid more, this switch could only lower their payment.

to be correlated with each other. For instance, low-density rural areas tend to be farther from metropolitan areas than medium-density rural areas, as evident from the maps presented later in the chapter. Comparing Ohio to west Texas makes the point. All of rural Ohio is within 50 miles of the downtown of a metropolitan area (although not necessarily a major metropolitan area). In contrast, many counties in west Texas are at least 100 miles from a metropolitan area.[17] Hence, low density can be seen as a proxy for distance from a metropolitan area.

A density-based definition also addresses another reason for bonus payments in very rural areas, which pertains to economies of scale in a physician's practice. A sparsely populated area has fewer people within easy travel distance of a health care facility, whether it be a physician's office or a hospital. A low-density rural area is more likely than a medium-density rural area to have too few people nearby to take advantage of economies of scale.

Where should the density threshold for the bonus be set? One important consideration is cost. The higher the threshold, the more expensive any bonus. For any given budget total, the more expensive the bonus the lower the payments to other areas.

Ironically, there will be no pressure from urban counties to switch the other way, from population-weighted density to conventional density, which would decrease the density measure. This switch could only lower their payment.

17. Travel time is more relevant than distance per se. Mountains increase travel time more than air miles would suggest. This is most relevant in the Rocky Mountain region, which has the lowest density within the Continental United States. It is also relevant in Appalachia; it is not likely that all of Appalachia would be designated low-density.

Table III-2 serves as a starting point for the cost issue. The distribution of the total population and the elderly population (as a proxy for the Medicare beneficiary population) is shown by the density of the county. As can be seen, the total and the beneficiary populations are distributed similarly across density categories, although a somewhat greater proportion of the beneficiary than of the total population is in low-density counties.

The distribution of physician charges is in sharp contrast to the distribution of beneficiaries, with proportionately less paid to physicians in low-density counties. (Note that charges are allocated to counties according to the location of the physician, not the residence of beneficiary.) Physician charges per beneficiary in counties below 35 persons per square mile are only one-third of the physician charges per beneficiary for the country as a whole. This should not be interpreted as indicating that physicians' charges vary at widely different rates, however. When charges per beneficiary are decomposed into physicians per beneficiary and charges per physician, it becomes clear that most of the variation is in physicians per beneficiary, not in charges per physician. This implies that charges per beneficiary reflect primarily the distribution of physicians (with rural residents often receiving service from urban physicians). The figures for urban and rural areas (MSA and non-MSA) are also presented.[18]

As can be seen, if the add-on payment were made only to frontier rural areas (6 persons per square mile), it would cover only 1 percent of Medicare beneficiaries and only 0.2 percent of the physician charges. A threshold of 35 persons per square mile would cover 10 percent of the beneficiaries and 3

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18. Only 18 urban counties out of a total of about 700 have densities below 35 persons per square mile.

percent of the charges. A threshold of 100 persons per square mile would cover 26 percent of the beneficiaries and 12 percent of charges.[19]

B. Results

We consider thresholds at 6, 20, and 35 persons per square mile. Maps III-1, III-2, and III-3 show the "very rural" counties under each threshold. Frontier rural areas are limited to the Rocky Mountain region and Alaska. At a density threshold of 20 persons per square mile, rural areas are limited mostly to the Rocky Mountain region and the western Great Plains, with few areas east of the Mississippi River. A density threshold of 35 persons per square mile adds much of the eastern part of the Great Plains and sections of the Southeast and northern New England.

A density threshold could be chosen to distinguish areas with barriers to physician supply without covering such a high proportion of charges that the bonus would be unaffordable in an essentially budget-neutral situation. Table III-2 provides some guidance. A threshold of 35 persons per square mile includes the areas with 3.0 percent of physician charges and 9.9 percent of beneficiaries; a threshold of 100 covers 12.4 percent of charges and 25.8 percent of beneficiaries. Since rural areas in total have only 14.3 percent of physician charges and 27.0 percent of beneficiaries, a threshold as high as 100 no longer makes a meaningful distinction among rural areas. A threshold of 35

19. Note that these figures from 1987 somewhat understate what the charges in rural areas will be under the Medicare Fee Schedule. First, charges in rural areas are disproportionately for visits, the relative fees for which will be increased. Second, geographic adjustments, as presently legislated, will redirect payment toward rural areas. CBO (1990, p. xiii) estimated that charges in rural areas will increase 8 percent under the fee schedule.

persons per square mile is a reasonable starting point for a discussion of such a policy.

In order to simplify the boundaries somewhat, we also developed an algorithm which makes the following modifications in the strict density-based definition:[20] (1) All counties in MSAs are excluded. This excludes the few urban counties that happen to have low population densities but are actually close to more densely populated areas. (2) Counties with densities above the threshold (including groups of two or three such counties) are included if they are surrounded by counties below the threshold. (3) Counties (including groups of two or three such counties) with densities below the threshold are excluded if they are surrounded by counties above the threshold.

Map III-4 shows the low-density counties at a threshold of 35 after the simplifying algorithm has been applied. When the unsimplified and simplified maps (III-3 and III-4) are compared, the simplification is visually apparent. The algorithm has the greatest impact in the eastern part of the Great Plains, where it is common for one, two, or three counties to have densities below the threshold of 35 but to be surrounded by counties exceeding the threshold. Conversely, it is common for several counties to exceed the threshold but to be surrounded by low-density counties. The western Great Plains and the Rocky Mountain region are now entirely low-density, with the exception of MSAs and a

20. There are conceptual reasons for simplification. Like most typologies, our definition of low-density rural areas classifies a county based only on that county's characteristics, thereby ignoring the characteristics of neighboring counties. A conceptual disadvantage of this approach is that the characteristics of neighboring counties may be relevant for two reasons: (1) residents may cross county lines for health care and (2) a county's density depends on how county lines are drawn. For instance, if a county is above a threshold density but surrounded by counties below that threshold, this may suggest that a redrawing of county lines would put this area below the threshold.

few contiguous counties. (Map III-5 shows MSAs.) East of the Mississippi River, low-density rural areas are found in the Deep South, West Virginia, and northern New England. Elsewhere in the East, low-density counties typically do not form a mass of low-density counties and are dropped by the algorithm.

How do our density-based bonus areas match with the HMSAs in terms of distribution? Map III-6 shows the distribution of rural counties with HMSAs. Comparing this with Map III-3 shows that the southeast has more HMSAs than low-density rural areas. This is consistent with the fact that there are 101 rural counties above our density cutoff that have poverty rates in excess of 25 percent, all of which are in the southeast. In contrast, the Rocky Mountain states and western Great Plains have fewer HMSAs than low-density rural areas. More generally, HMSAs follow a less regular pattern than low-density areas, making boundary issues more prominent. When one takes into account that some HMSAs are only parts of counties, boundary problems are accentuated.

C. Effect on Payment Levels

At a cutoff of 35 persons per square mile, there would be low-density rural areas in all states except New Jersey, Connecticut, Rhode Island, Massachusetts, Delaware, Maryland, the District of Columbia, and Puerto Rico.[21] States with substantial low-density rural areas tend to have GPCI values of between .90 and .95. In a typical rural state, therefore, a 10 percent bonus would increase the payment levels in its low-density rural areas to between .99 and 1.04.[22] In other words, physicians in low-density rural areas would typically be paid at or slightly above the national mean.

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21. If a simplifying algorithm is applied, several additional states may also lack low-density rural areas.

22. If the GPCI were renormalized to ensure budget neutrality, all GPCI values would drop by about .003.

With the density-based bonus, the highest payment level would be in Alaska, with a value of 1.28. This seems appropriate since Alaska has an especially high cost of living (federal workers in Alaska receive a 25 percent cost-of-living allowance) and few amenities to attract physicians. Our original GPCI included the full price proxy for physicians' own time. As already noted, the GPCI as enacted included only a quarter of this proxy, in part, to help rural areas—because applying less than the full value of the proxy raises GPCI values that are below 1.00 and lowers those that are above. In Alaska, ironically, this modification lowered the GPCI value because Alaska, although largely rural, has costs which are well above average. It is the only predominantly rural state with such a cost structure. One advantage of a bonus for low-density rural areas is that much of Alaska would be paid 12 percentage points more. (The Anchorage MSA, which has less than one percent of the state's area but almost half its population, would not be included.)

One major anomaly produced by our density-based bonus calculation is that the payment level would be almost as high in the low-density rural areas of very urban states as in the urban cores. For instance, the payment level would be 1.22 in rural California and 1.21 in rural New York. Each of these states has only a handful of counties that are low-density rural. The statewide GPCI values are high because the states are predominantly quite urban. The low-density bonus would increase these values by 10 percent. This anomaly could be resolved by also recognizing MSAs or CMSAs. This combination policy would yield a payment pattern that is shaped like a lopsided U relative to population density of counties: Payment would be lowest for medium-density areas (the bulk of the country's population), next highest for the lowest-density areas, and highest for the highest-density areas.

D. Conclusion

There is a precedent for separating very rural from rural areas in Canada, where the health insurance program is administered at the provincial level. Several Canadian provinces pay bonuses to physicians who practice in very rural areas (Canada, 1989). Quebec, for instance, pays a 15 percent bonus to general practitioners in very rural areas and a 20 percent bonus to specialists there. Since much of the land area of the province has densities below one person per square mile, these bonuses apply to most of the area of the province. These areas are not defined strictly in terms of population densities, but the areas are much more similar to low-density rural areas (35 persons per square mile) than to rural areas (Quebec, 1987).

Manitoba provides a second example. Physicians in rural, southern Manitoba are paid 5 percent more than in Winnepeg, the sole urban area. Physicians north of the 53rd parallel (the province is between the 49th and 60th parallels) receive a 10 percent bonus.

This chapter makes three cumulative suggestions, the first being the most abstract and the last the most concrete:

- Rural HMSAs could be replaced by very rural areas, in part, because such areas are at risk for physician shortages. The geographic unit would be the county, the criterion would involve a variable outside the medical sector, and the designation would be made by HCFA.
- These very rural counties could be defined in terms of population density.
- A population density of 35 persons per square mile could be a reasonable threshold for distinguishing such counties.

The approach is consistent with the way we suggest defining urban areas.

Table III-1

Percentage of Rural Counties with an HMSA, by Density and Poverty Status

Density (persons per square mile)	Percentage Poor			
	0-15	15-25	25+	All
0 - 20	43	62	75	55
20 - 50	37	53	68	49
50 - 100	32	39	53	37
100+	26	25	25	26
All Rural	37	52	69	47

Table III-2

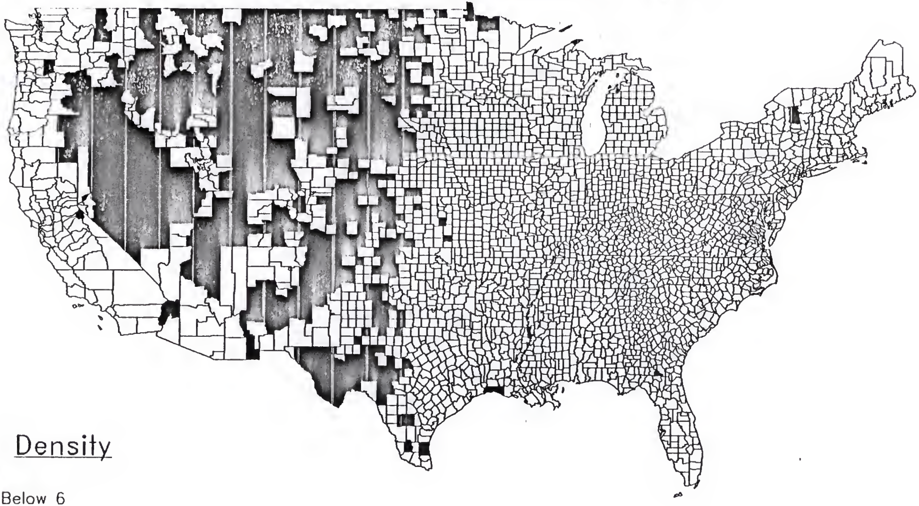
Distribution of Population and Physician Charges, by Density of County

Density (persons per square mile)	Cumulative Percentage			
	Population			
	Total	Elderly[a]	Physician Charges	Physician Charges/ Elderly[a]
0-6	1.0%	1.0%	0.2%	0.19
6-20	4.0	4.8	1.3	0.26
20-35	7.9	9.9	3.0	0.31
35-50	11.9	14.7	5.2	0.35
50-100	22.6	25.8	12.4	0.48
100-250	38.1	40.8	26.4	0.65
250-1000	64.0	64.9	53.1	0.82
1000+	100.0	100.0	100.0	1.00
	* *	* *	*	
Rural	23.0%	27.0%	14.3%	0.53
Urban	77.0	73.0	85.7	1.17
	100.0%	100.0%	100.0%	1.00

Source of physician charges: 1987 BMAD Provider File.

a. The elderly population is used to approximate the Medicare beneficiary population.

Map III - 1. Counties with Densities Below 6 Persons/Sq. Mile

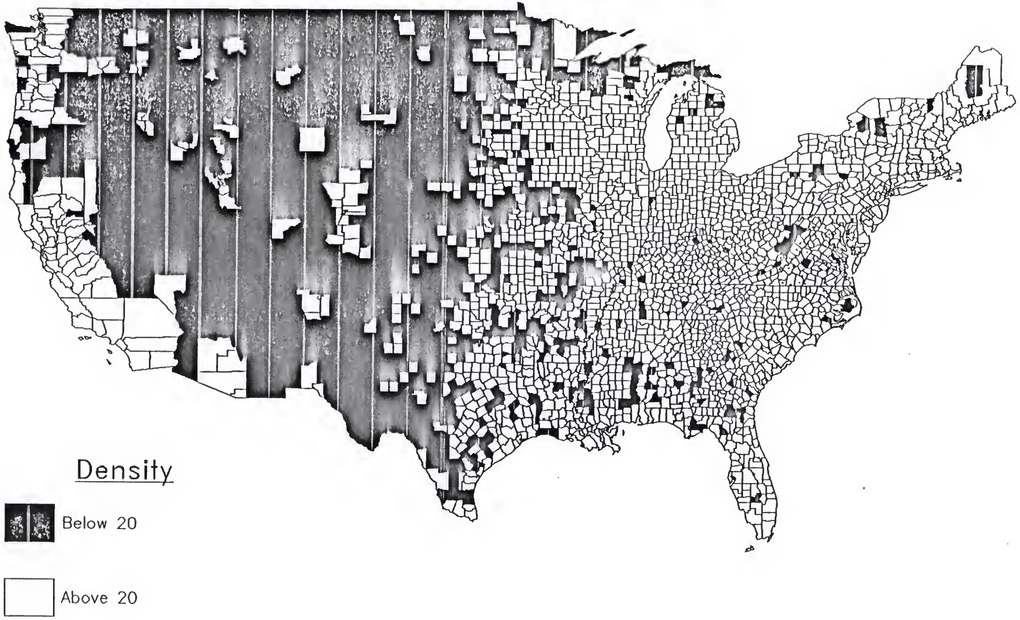


Density

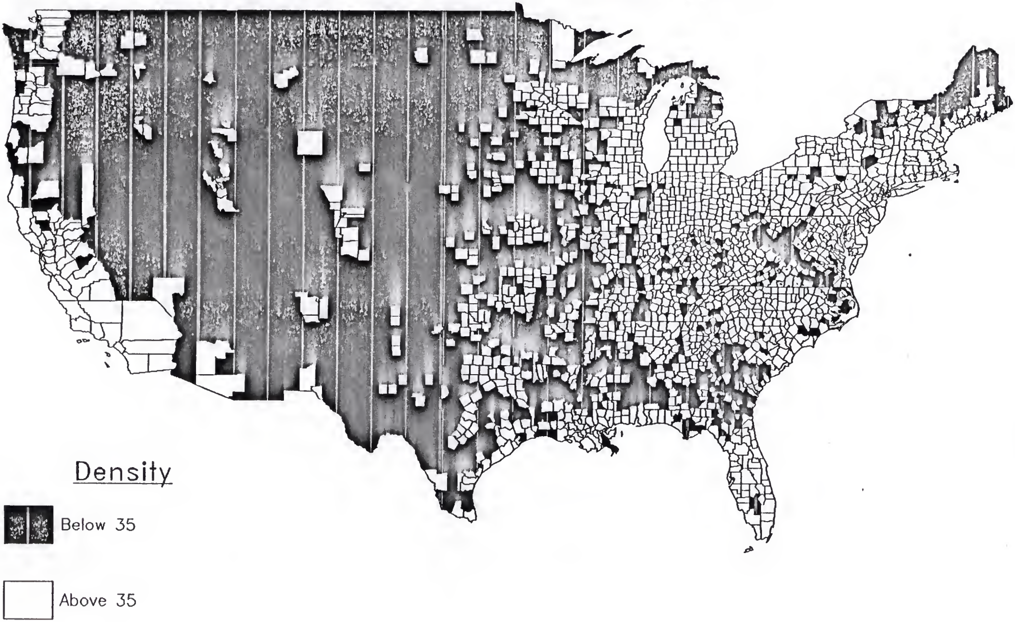
Below 6

Above 6

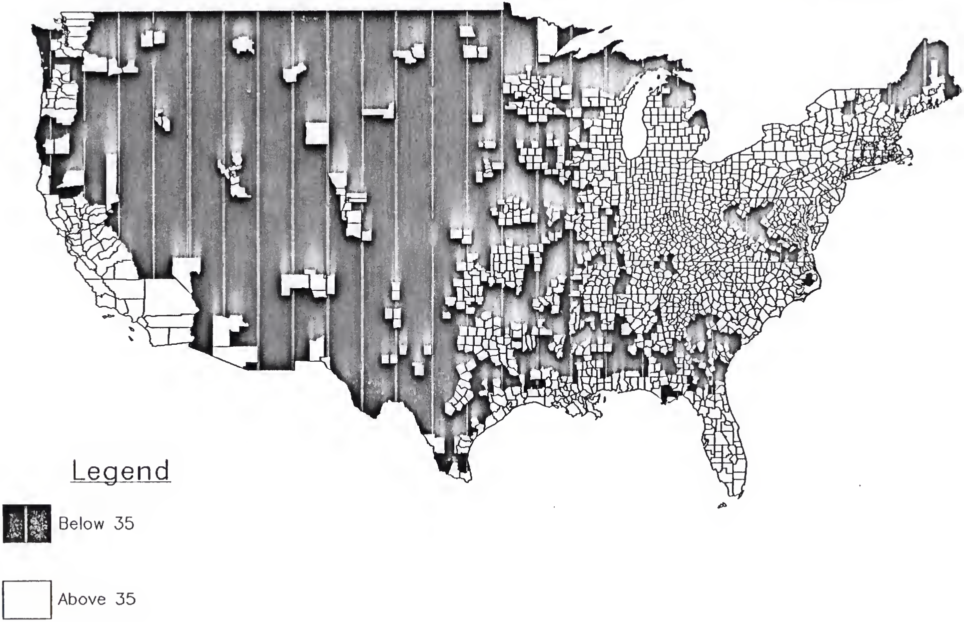
Map III - 2. Counties with Densities Below 20 Persons/Sq. Mile



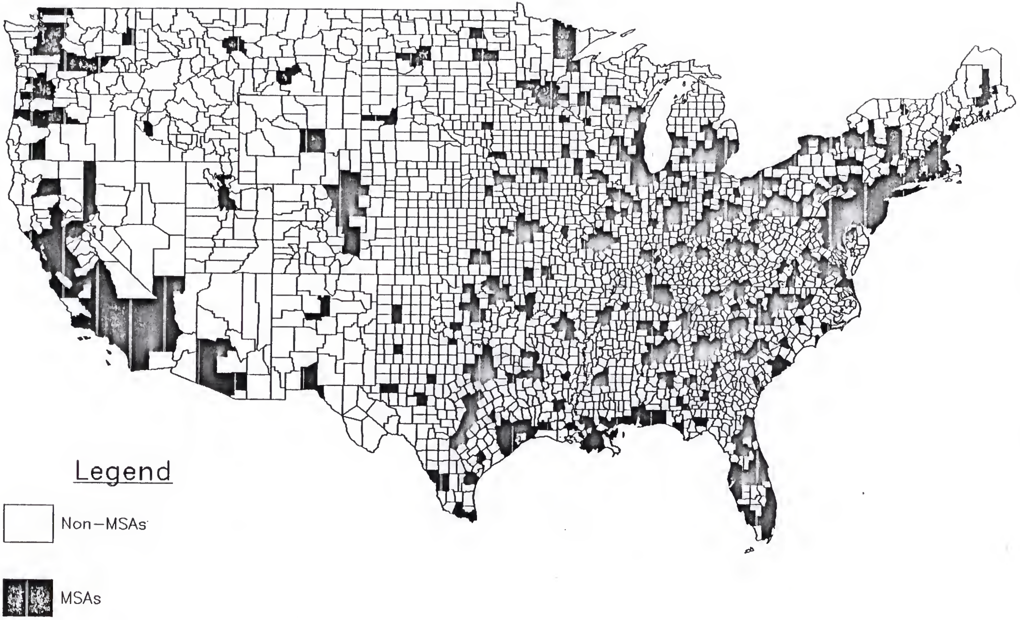
Map III - 3. Counties with Densities Below 35 Persons/Sq. Mile



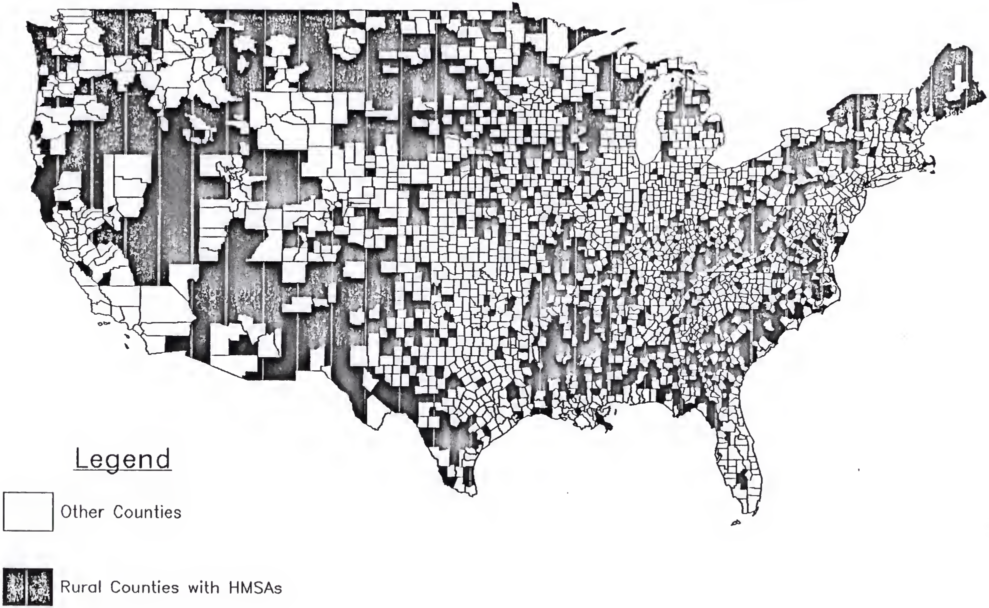
Map III-4. Counties with Densities Below 35 Persons/Sq. Mile (Simplified)



Map III-5. MSAs



Map III - 6. Rural Counties with Health Manpower Shortage Areas



IV. INPUT PRICE DATA FOR URBAN CORES AND LOW-DENSITY RURAL AREAS

One of our criteria for the configuration of payment areas is that Medicare payment to physicians be associated with the cost of practice. Ideally, the configuration would yield payment areas in which the cost of practice was the same but across which the cost of practice would vary. The relationship between payment and cost of practice can always be strengthened by making the payment system more complex. However, another criterion is simplicity. Complexity makes the system somewhat more difficult to administer, and it certainly makes the system less comprehensible to providers and policymakers. To the extent that different geographic areas have the same cost of practice, the system could be simplified with little loss of accuracy in payment levels if those areas were combined for payment purposes.

To better understand the tradeoff between accuracy and simplicity, this chapter calculates price proxies for two inputs: physicians' own time and employee wages. Malpractice premiums are not included because they do not vary systematically by density. Rents are not included, because our proxy for rents (e.g., HUD data) is not available by counties within metropolitan areas.

A. Methodology

Our earlier work used data on median earnings for a number of occupations from the 1980 Census. This chapter further exploits that data set, which has both mean and median earnings for counties, as well as for MSAs and rural areas of states. These county-level data are used to calculate average earnings for the county groups suggested in Chapters II and III.

The methodology is similar to that of the earlier report in that professional earnings are adjusted for education and occupational mix. Adjustment for occupational mix is discussed below. Adjustment for education involves limiting the sample of professionals to earners with at least 5 years of college.

The methodology is different from that of the earlier report in several ways: the earnings data are all by place of work instead of being in part by place of residence, means are used instead of medians, and normalization (which yields a national mean of 1.000) is by the number of workers instead of by population. Regarding the first issue, place-of-work data are essential for urban cores in large CMSAs, where there is substantial commuting from the suburban ring into the core.[23]

We use means instead of medians in order to calculate standard errors for groups of counties. In addition, going from county-level averages to county group averages is easier for means than medians. For means, the weighted sum of county-level means equals the mean for the group of counties; for medians, no comparable relationship holds.

For each county and for each of ten occupational groups, mean earnings are calculated. Then for each county, we take a weighted sum of mean earnings across occupational groups, where the weights are (as before) the national proportion of workers in that occupational group.[24] This is done separately

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23. The Census has a 10 percent sample by place of work but a 20 percent by place of residence. Previously place-of-work data was used in CMSAs, where there is substantial commuting across MSA lines. Place-of-residence data was used elsewhere, where the larger sample size was often important. This chapter calculates price proxies not for specific MSAs but rather for county groups, each with many counties. Thus, sample size is less of a problem than earlier.

24. When a county has no workers in a certain occupational group, that group is dropped and the weights of other groups are proportionately increased, so that the relevant weights still sum to one.

for the six occupational groups used for physicians' own time and the four occupational groups used for employee wages.

More precisely, the physicians' own time price proxy is based on the following weights by occupational category:

.140	engineers
.067	natural scientists, mathematicians
.259	social scientists, social workers, lawyers
.436	teachers
.056	RNs, pharmacists
.042	writers, artists, athletes

The employee wage price proxy is based on the following weights by category:

.604	administrative support personnel, including clerical
.204	registered nurses
.069	licensed practical nurses
.123	health technicians, excluding LPNs

(See Tables II-3 and III-4 in our 1989 report.)

For each county group, a mean is calculated that is unweighted by the number of workers in a county in order to allow easy computation of standard errors for each county group. To facilitate comparisons, the means are normalized to the national average using the number of workers.

B. Results

Before investigating earnings by possible Medicare payment areas, we test whether earnings follow the theoretical patterns discussed in Chapter I. Earlier work has demonstrated that wages tend to be highest in the urban core of metropolitan areas and lower in the suburban ring. Furthermore, wages tend to be highest in large metropolitan areas and lower in small metropolitan areas.

As shown in Table IV-1, for CMSAs with populations above three million, we distinguished a "supercore." These are simply the counties included in the large-CMSA option: the county with the highest density in a CMSA and any other

counties in a CMSA with densities above 6,000. Similar to Chapter II, for CMSAs with populations between 1 and 3 million, the core includes the densest county and any other county with a density above 3,500. The suburban ring includes the remaining counties in the CMSA. The counties in the "supercore" or core can be identified from Table II-3.

In discussing the earnings patterns in Table IV-1, we focus on employee wages, because the GPCI as legislated incorporates 100 percent of this price proxy but only a quarter of the physicians' own time. The wages of occupations employed by physicians (primarily secretaries and nurses) follow the pattern discussed in Chapter I.[25] Physician employees, for instance, have earnings 11.8 percent above the national average in the densest counties in the largest CMSAs, but 1 percent below the national average in the least dense counties in the those same CMSAs. They have earnings 6.7 percent above the national average in medium density counties in those CMSAs. In CMSAs with populations between 2 and 3 million, earnings in the core substantially exceed those in the ring, as they do in CMSAs with populations between 1 and 2 millions. All of these differences are significant (at 5 percent with a one-tail t-test). They are also significant for professionals. The effect of density on two inputs prices for physicians is clear.

Table IV-1 also shows the effect of metropolitan size. Even when the densest counties in the largest CMSAs are categorized in the supercore, physician employees have earnings that are 6.7 percent above average in the cores of CMSAs with populations above 3 million, but only 1.1 percent above average in the cores of CMSAs with populations between 2 and 3 million. A

25. The core of the New York CMSA has 46 percent of counties in the "supercore" category. This core includes four counties in northern New Jersey.

similar pattern holds for the rings of these groups of CMSAs. These differences are significant for both physician employees and professionals. Differences between CMSAs with between 2 and 3 million population and CMSAs with between 1 and 2 million population are generally not significant. Overall, the spatial economic model is confirmed, and the case for using density to define geographic payment areas is strengthened.[26]

Having investigated the spatial pattern of these two price proxies in a theoretical context, we are better able to consider simplifications for payment purposes. Table IV-2 presents the two proxies by the six categories suggested in Chapters II and III:

- counties with densities above 6,000 in CMSAs with populations above 3 million,
- counties with densities above 3,500 in CMSAs with populations above 2 million (but not in the first category),
- counties with densities above 3,500 in CMSAs with populations between 1 and 2 million,
- all other urban counties,
- rural counties with densities above 35 (medium-density rural areas), and
- all other rural counties (low-density rural areas).

For the core options, Table IV-2 is a simplification of Table IV-1. For instance, the second row in Table IV-2 incorporates two cells in Table IV-1; that is, the weighted average of 1.067 and 1.011 from the first table is 1.042 in the second table.

26. These results are broadly consistent with recent work on hospital wages (Hendricks, 1989), although her methodology differs from ours in several ways: in particular, she (1) used MSAs instead of CMSAs as the delineation of metropolitan area, (2) used central city, urbanized suburb, and nonurbanized suburb to subdivide metropolitan areas, and (3) did not investigate the effect of metropolitan size on wages.

Much of Table IV-2 is a reformulation of Table IV-1. Again, the price proxies increase with population density. Going beyond Table IV-1, however, these proxies are substantially higher in "other urban areas"—suburban rings and small metropolitan areas—than in rural areas. Within rural areas, price proxies are lower in low-density rural areas than in medium-density areas.

Deciding how to define urban cores would be based on a number of considerations. However, clear practice cost differences by type of area are one such consideration. The large difference (.076) in wages between large and medium CMSAs versus the smaller difference (.051) between medium and small CMSAs suggests there may be greater reason to choose the large-CMSA option.

A second implication drawn from Table IV-2 is that low-density rural areas have somewhat lower input prices than medium-density rural areas. Any difficulty in attracting physicians to low-density rural areas, therefore, is not the result of higher input prices. Hence, input price data do not provide a justification for a bonus.

In translating the spatial pattern of these two components of the GPCI, one should keep in mind several things: (1) Only a quarter of the physicians' own time component is incorporated into the GPCI. (2) The rent gradient is substantially steeper than the employee wage gradient (Table IV-2 in the original report), as theoretically it should be. (3) We have not considered the spatial pattern of malpractice premiums. (4) Finally, the GPCI includes a residual category, which is assumed not to vary geographically. The impact of this category is to dampen any variation in the GPCI. In sum, the geographic differentials of the GPCI may vary somewhat from the differentials of the employee wage component shown in Table IV-2.

Table IV-1

Two Price Proxies, by CMSA Size and County Density (Standard errors in parenthesis)

CMSA Population Size	"Supercore"	Core	Ring
	Employee Wages		
> 3 million	1.118 (.014)	1.067 (.021)	.990 (.011)
2-3 million	- -	1.011 (.019)	.932 (.014)
1-2 million	- -	.991 (.012)	.939 (.012)
	Physicians' Own Time		
> 3 million	1.129 (.015)	1.073 (.021)	.952 (.014)
2-3 million	- -	1.026 (.014)	.835 (.020)
1-2 million	- -	.986 (.018)	.863 (.012)
	Number of Counties		
> 3 million	24	13	76
2-3 million	—	11	56
1-2 million	—	18	78

Notes:

The price proxies have been normalized to the national average using the number of workers.

In CMSAs over 3 million, supercores are those counties with densities above 6,000 people per square mile and cores are those with densities between 3,500 and 6,000. In CMSAs below 3 million, supercores are not distinguished and cores are all counties with densities above 3,500. The densest county in a CMSA is automatically part of the core (or supercore). In all CMSAs, rings are counties with densities below 3,500.

pw.gpci:tab iv-1

Table IV-2

Two Price Proxies, by Density-Based Categories of Counties

County Category	Employee Wages	Physicians' Own Time	Number of Counties
Large-CMSA option	1.118	1.129	24
Large- and Medium-CMSA option (but not Large-CMSA option)	1.042	1.051	24
All-CMSA option (but not Large- and Medium-CMSA option)	.991	.986	18
Other urban areas	.921	.881	675
Medium-density rural areas	.854	.829	970
Low-density rural areas	.843	.756	1426

Note: The price proxies have been normalized by the national average using the number of workers.

V. POLICY OPTIONS FOR URBAN AREAS

This report has dealt with two issues related to the Medicare Fee Schedule. The first is delineation of the geographic units to serve as the basis for the GPCI. Currently Medicare pricing localities are used. The second is the geographic unit for the 10 percent bonus to attract physicians to areas in which they normally are reluctant to practice. The latter is the more straightforward to deal with and will be discussed first.

We suggest replacing rural HMSAs, which currently serve as the geographic unit for the bonus, with low-density rural areas. One might define these areas as rural counties in which population density is below 35 persons per square mile.[27]

Such an approach would ensure that the bonuses went to areas that are inherently unattractive to physicians, rather than areas that are simply short of physicians at a given point in time. It has the advantage of being administered by HCFA rather than the Public Health Service. It would delineate areas that are more stable over time and have fewer boundaries than HMSAs. And this stability, in turn, would decrease the frequency of HCFA having to remove bonuses from certain areas—as is inevitable with HMSAs. A population density threshold of 35 persons per square mile would affect roughly 3 percent of physician charges, but affect the areas with about 10 percent of beneficiaries. Lower thresholds cover very small proportions of total charges. Higher

27. Rural counties meeting this criterion that are completely surrounded by higher density counties might not be classified as low-density rural areas.

thresholds quickly include most rural areas, making the distinction between types of rural areas pointless.

- The low-density rural areas could be used as the basis for bonus payments in conjunction with the current set of pricing localities or with a new set of geographic areas for making the GPCI adjustment. As Chapters II and IV indicate, the accuracy of the GPCI adjustment may be improved if urban areas —particularly cores of urban areas—were distinguished from the rest of a state. The remainder of this chapter discusses these policy options for urban areas.

A. Tradeoffs

In many ways statewide payment areas are attractive. Their great strengths are ease of administration and conceptual simplicity.[28] Ease of administration, although not key in the immediate future, could become quite important were Congress to apply volume performance standards to the state level. Because controlling volume will be a key Medicare issue in the future, simplicity is a major concern. The primary problem with statewide payment areas is the perception and (according to the GPCIs) the reality of underpayment in large metropolitan areas, particularly in the cores of those areas.

Given these concerns, it is useful to rank payment area options by simplicity. There are probably several metrics for doing so. For exposition, we use the number of payment areas as a measure of administrative complexity.

The options are ranked from the simplest to the most complex as follows:

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28. The PPS payment areas have been modified over time, such that hospitals in certain rural counties are now paid the same as hospitals in neighboring urban counties. Because states are a more familiar concept than in MSAs, the pressure for incremental change would be less under a statewide configuration than a PPS-type system.

Option Description	Number of Payment Areas
Statewide	52
Cores of large CMSAs: over 3 million	63
Cores of all CMSAs: over 1 million	89
Large MSAs: over 1 million	94
All MSAs	370 (approx.)

At least two types of options are excluded from this ranking: (1) We exclude options where the thresholds themselves are higher than one million and are applied to MSAs. As noted early in Chapter II, a threshold of two million as applied to MSAs (but not CMSAs) excludes Newark and San Francisco, which are in two of the most urban counties outside of New York City. For this reason we believe such an option could be dropped from serious consideration.
(2) Intermediate options such as CMSAs over 2.5 million are not explicitly considered here, although their characteristics can be interpolated from our data.

Large-CMSA Option. There are 11 large CMSAs. California and Texas each have two CMSAs, resulting in 40 statewide payment areas and 63 payment areas in total.[29]

All-CMSA Option. There are 37 CMSAs, resulting in 24 statewide payment areas and 89 payment areas in total.

Large-MSA Option. There are 43 large MSAs, resulting in 23 statewide payment areas and 94 payment areas in total. Although all-CMSA and large-MSA options involve a population threshold of one million, there are 5 fewer payment areas delineating the cores of CMSAs rather than the large MSAs. This

29. Only New York and D.C. have cores that cross state lines. Here we assume that the New York core is split into its New York and New Jersey components and the D.C. core is not split.

is because several large PMSAs are in the same CMSA (e.g., the San Francisco CMSA includes the large PMSAs of San Francisco and Oakland.

- All-MSA Option. Finally, there are about 320 MSAs, resulting in no statewide payment areas and about 370 payment areas in total.[30]

There are, in essence, five options for configuring urban areas. One of those options—all MSAs—is substantially more complex than the next most complex option—large MSAs. The all-MSA option would have about 370 payment areas, a sizable increase from the 240 localities under the status quo. For this reason we drop the most complex option—all MSAs—from further consideration. (The GPCI values under this configuration are presented in Appendix 3.) There are four remaining options for urban areas.

B. GPCI Values by Option

The GPCI values are those proposed for the Spring 1991 Notice of Proposed Rule Making; that is, the malpractice GPCI has been remapped and Patient Compensation Funds have been recognized. As in our previous reports, GPCI values are normalized using the general population. That is, each set of GPCI values has a mean of 1.000 when weighted by population.[31] The GPCIs presented have only a quarter of the physicians' own time component, as legislated.

States: As shown in Table V-1, statewide payment areas would result in GPCI values that range from .809 in Puerto Rico to 1.162 in Alaska.

Large CMSAs: The second column in Table V-1 presents the GPCI values when the cores of large CMSAs are distinguished. In California, the effect is to

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30. Although the ranking of two options—the cores of all CMSAs and the large MSAs—is open to debate, the metric used here suggests that large MSAs is the more complex.

31. Note also that we present a single GPCI, although the GPCI was legislated with three separate components.

raise the index from 1.106 to 1.132 for Los Angeles County (an increase of 2.6 percentage points) and from 1.106 to 1.148 for San Francisco and Alameda (Oakland) Counties (an increase of 4.2 percentage points). These counties are separated from the rest of the state, where the GPCI falls from 1.106 to 1.088 (a drop of 1.8 percentage points). In New York City the GPCI increases from 1.103 to 1.178, and increase of 7.5 percentage points. In the New Jersey section of the New York CMSA, the GPCI increases only slightly.[32]

The GPCI is always higher in the core than the rest of the state, as shown in Table V-2. The simple average of the differences between the cores and the rest of the states is 7.6 percentage points.

Large MSAs: The third column of Table V-1 presents the GPCI values when only large MSAs (over one million) are distinguished from the remainder of the state. (As discussed in Chapter II, this option would be a simplified version of the areas used by PPS.) For states without large MSAs, whether large CMSAs or large MSAs are distinguished does not affect the GPCI value. In California, however, GPCI values are affected in large MSAs that are not in the core of large CMSAs. These areas include San Mateo and Marin Counties, which are noncore counties in the San Francisco PMSA, and the San Jose PMSA, which is a large PMSA but not in the core of the San Francisco CMSA. San Jose's value increases from 1.088 to 1.162, an increase of 7.4 percentage points. The areas in California that lose the most are outside of the large MSAs (residual areas); their value falls from 1.088 to 1.048, a drop of 4.0 percentage points.

32. For CMSA cores that are in two states, the GPCI values are calculated separately for the two components. Under the large-CMSA option, this approach affects only the New York CMSA, because no other CMSA core crosses state lines except Washington, D.C., which is not subdivided into PMSAs, such that each section has the same GPCI value.

In New York, moving from large CMSA cores to large MSAs increases the value slightly in the New York City PMSA and lowers it somewhat in the Nassau-Suffolk PMSA. The value in the residual areas of the state falls again: from 1.103 in the statewide system to 1.020 when CMSA cores are distinguished to .984 when large MSAs are distinguished. The second drop is the result of removing Rockland and Putnam Counties (in the New York City PMSA) and Suffolk County from the residual category.

All CMSAs: Relative to the large-CMSA option, this option has the greatest impact in CMSAs with populations between one and three million, as expected. For instance, the GPCI value for St. Louis increases from .966 to 1.009 whereas the value for the residual areas of Missouri decreases from .966 to .958. Note that several large CMSAs experience a drop in GPCI value, because a county in another PMSA is added to the core. For instance, Miami experiences a decrease from 1.070 to 1.057, because Fort Lauderdale, a PMSA in the Miami CMSA, is added to the Miami core. The GPCI value for Fort Lauderdale alone, 1.035, is shown in the column for large MSAs.

Under this option, the average differential between core and residual area is only 2.0 percentage points for medium and small MSAs. This is substantially less than the average differential of 7.6 percentage points for large CMSAs under the large-CMSA option.[33]

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33. The cores of Baltimore, Norfolk, Buffalo, and Hartford have lower values than the residual areas of their states, which include the suburbs of either Washington, D.C. or New York City.

C. Boundary Differentials

One of the criteria presented in Chapter I is that there not be excessive differentials in GPCI values between contiguous areas. The source of this concern is PPS' experience with boundaries. Before discussing the boundary differentials of specific options, it is important to understand the size of the boundary differentials in PPS, the source of the concern.

PPS payment to a hospital is related to the standardized amount, which varies by region and urban-rural location, and by wage, which varies by MSA. In 1984 the standardized amount was 20.2 percent higher in urban areas than rural areas. By 1990 it was only 7.8 percent higher in (large) urban areas (PRO-PAC, 1990). Even with this drop, the differentials at the boundaries of MSAs and rural areas are often large. For instance, hospitals in Washington, DC are paid 32 percent more than hospitals in rural Virginia (other things being equal).[34] Hospitals in Chicago are paid 36 percent more than hospitals in rural Wisconsin, the southern part of which borders the Chicago PMSA.

If statewide payment areas were used as the basis for the geographic adjustment in the Medicare Fee Schedule, the boundaries with the largest differentials would be as follows:

New York (1.103) versus Vermont (.919),

Washington, DC (1.095) versus Virginia (.962), and

Illinois (1.054) versus Iowa (.932) and Kentucky (.923).

More often than not, these differentials involve a highly urban state, such as New York, that borders a very rural state, such as Vermont. The largest

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34. The national average is calculated here using a wage index of 1.00 and the national standardized amounts for small urban areas. Hospitals in Washington receive 106 percent of this average and hospitals in rural Virginia receive 74 percent of this average, the differential being 32 percent.

differential is, in fact, between these two states and is .184. Otherwise, the differentials are less than .15.

- The between-state differentials tend to be lower when urban cores are distinguished. In particular, the GPCI value for the residual areas of New York falls from 1.103 to 1.020 when large CMSA cores are recognized, such that the differential with Vermont falls from .184 to .101. The GPCI for residual areas of Illinois falls from 1.054 to 1.004 and for residual areas of Michigan falls from 1.054 to 1.033. The greatest between-state differential under this option is between Washington, DC (1.095) and Virginia (.955)—a differential of .140.[35]

Interestingly, the largest differentials under the large-CMSA option are <u>within</u> states. For instance, the New York CMSA core has a value of 1.178, whereas the residual areas of New York have a value of 1.020, yielding a differential of .158. Table V-2 above presents other examples.

Substituting large MSAs for large CMSA cores increases the population that is separated out from the residual areas. Not surprisingly, the differentials between states tend to decrease further and the differentials within states tend to increase further. In residual areas of New York, the GPCI value falls from 1.103 (statewide) to 1.020 (large CMSAs) to .984 (large MSAs). The differential with Vermont (whose GPCI value is the same across these options) falls from .184 to .101 to .065. The drop in the GPCI value for the residual area of New York, however, increases the differential with New York City.[36] As

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35. The Virginia GPCI value falls slightly here because Arlington and Alexandria are part of the Washington, DC core.

36. Note that the New York City area has been changed from the CMSA core to the PMSA.

a result, the differential increases from .158 to .195. The within-state differentials in New Jersey, however, are no more than .037.

- In California, the value for the residual areas falls from 1.088 (large CMSAs) to 1.048 (large MSAs). This lowers the differential with Oregon but increases the within-state differentials. The largest differential within California—between the San Francisco PMSA and the residual areas—is .115.

Payment differentials at boundaries are an inherent part of any geographic variation in payment. The boundary differentials under any of these configurations are substantially less than under PPS. Except for possibly statewide payment areas, boundary differentials do not appear to be a problem and do not identify any options as inferior or superior than any other.[37]

D. Conclusion

The fundamental issue that this report wrestles with vis-a-vis urban areas is whether to subdivide states. The primary advantage of using states as the basis for the geographic adjustment is simplicity; the primary disadvantage is underpayment in parts of urban areas, particularly in the cores of large metropolitan areas. The most basic choice is probably between statewide

37. If boundary differentials are deemed to be excessive, additional payment areas might be delineated to spread a differential over two boundaries. For instance, the New York City core and the residual area of New York State have the greatest differential under the large-CMSA option (Table V-2). Westchester County, the northern part of the New York core, could be defined to be a separate payment area. Since explicit purpose of such a payment area would be to mitigate the boundary problem, Westchester might receive the simple average of the GPCI values for core and the residual area. Then the differential of 15.8 percentage points between the core and the residual area would be replaced by a differential of 7.9 between the core and Westchester and another differential of 7.9 between Westchester and the residual area. The second largest differential is between Washington, DC and Virginia. A similar stepdown payment area could be delineated, perhaps including Alexandria, Arlington, and Fairfax Counties.

payment areas and some method of distinguishing urban areas; the secondary choice is between the three proposed methods of defining urban areas.

As Table IV-2 shows, the components of physicians' own time and employee wages are substantially higher in the cores of large metropolitan areas than nationally. If practice costs substantially exceed payment levels, there is a danger that in the long-term physician participation in Medicare may fall sharply in these areas.

The point can be made in two other ways. First, the federal government is facing the same problem of varying salary by geography. As cited in our earlier report, the FBI (Isihoff, 1988) increased its pay for agents in New York City by 25 percent in 1988:

> "The new pay levels for New York...are the first response to what bureau officials say has become a growing morale and staffing problem in some of its key offices across the county.
>
> "The problem has been most acute in New York, where pay scales have fallen so far behind the cost of living that agents were resigning rather than accepting transfers there,...
>
> "The FBI is also considering raising the pay for agents in Los Angeles, San Francisco, Chicago, Boston, and Newark."

These six cities are all in the cores of CMSAs over three million (large-CMSA option). Varying government salary by location was proposed by the Administration in 1990 and enacted by the Congress (Havemann, 1990). Varying Medicare payment at the state level will capture some but not all of the variation nationally.

Second, if the GPCI is implemented under localities, Medicare payment to physicians in several cores of large metropolitan areas will fall sharply. If states are substituted for the present localities, there will be further redistribution away from these cores. The clearest example is New York City. A prevailing charge index developed by Pope et al. (1988) measures fees prior to the schedule. In New York City, a prevailing charge index of 1.331 will be

replaced by a GPCI of 1.178 under the locality approach. (Our original GPCI, which had a full component for physicians' own time, was 1.279.) A statewide payment area would result in a further drop, to a GPCI of 1.103.

If policymakers decide to recognize some urban areas within states, they have three plausible options, each with its advantages. The large-MSA option has the advantage of familiarity because of PPS's use of MSAs. Unlike the CMSA-based options, this option would also recognize the variation in the GPCI within the largest CMSAs (e.g., San Francisco PMSA versus Oakland PMSA). Relative to rural areas, it would pay more in the suburban rings as well as in the cores, even though input prices are less in the ring than in the core (Table IV-1).

Relative to the large-MSAs option, the all-CMSA option has the advantage of somewhat less complexity, that is, fewer substate areas are created. It is also more focused on the sections of a state with the highest costs of practice. As a result, 43 percent of physician charges are in CMSA cores whereas 51 percent are in large MSAs. The disadvantage of the all-CMSA option is the lack of policy precedent.

The large-CMSA option is the option that adds the least number of substate areas but recognizes urban areas within states. Practice costs are substantially higher in these cores than in the remainder of the CMSAs and in the cores of other CMSAs (Table IV-2). This suggests that the large-CMSA option does a better job of distinguishing areas with high practice costs than options with more areas. In facing a similar problem, the FBI felt the need to distinguish only six cities, all of which are in this option. The large-CMSA option is conceptually better grounded than the large-MSA option in two ways. First, the Census Bureau considers the CMSA to be the fundamental unit of a

metropolitan area. Second, the delineation of the core is well-founded in spatial economic theory. The primary disadvantage of the large-CMSA option is that both policymakers and physicians are unfamiliar with CMSAs as distinct from MSAs.

The three means of subdividing states to recognize urban areas each have their advantages and disadvantages. Policymakers will have to decide which, if any, is preferable to the status quo.

An important argument against recognizing urban areas at all is complexity. But the federal government, after years of virtually ignoring geographic location when paying its employees, will start to vary pay by location. The details of payment reform are gradually spreading within the physician community, which only partially understands the implications for the urban areas with high practice costs and high allowed charges in the past. The areas at a disadvantage may push for some modification of the payment mechanism, similar to how wage areas under PPS have been modified. For instance, physicians in Chicago might argue that because their practice costs are 10.9 percentage points higher than the rest of the state's (Table V-2), their payments should be increased by 10.9 percentage points. That is, they may use practice costs in the residual areas as the baseline.

Over the long term, the choice could be between systematic recognition of areas with high practice costs and piecemeal recognition. The latter is unlikely to yield a conceptually defensible set of adjustments.

Table V-1

GPCI Values under Several Options

State/MSA	Statewide	Large CMSA	Large MSA	All CMSA
Alabama				
Statewide	0.927	0.927	0.927	0.927
Alaska				
Statewide	1.162	1.162	1.162	1.162
Arizona				
Phoenix MSA	1.005	1.005	1.022	1.022
Residual areas	1.005	1.005	0.984	0.984
Arkansas				
Statewide	0.882	0.882	0.882	0.882
California				
Anaheim PMSA	1.106	1.088	1.134	1.132
Los Angeles PMSA	1.106	1.132	1.132	1.132
Oakland PMSA	1.106	1.148 *	1.140	1.156 *
Riverside-San Bern. PMSA	1.106	1.088	1.067	1.064
Sacramento MSA	1.106	1.088	1.073	1.073
San Diego MSA	1.106	1.088	1.074	1.074
San Francisco PMSA	1.106	1.148 *	1.163	1.156 *
San Jose PMSA	1.106	1.088	1.162	1.156
Residual areas	1.106	1.088	1.048	1.064
Colorado				
Denver PMSA	0.977	0.977	1.005	1.005 *
Residual areas	0.977	0.977	0.950	0.971
Connecticut				
Hartford PMSA	1.048	1.048	1.048	1.036 *
Residual areas	1.048	1.048	1.048	1.053
Delaware				
Statewide	1.002	1.002	1.002	1.002
District of Columbia				
Washington MSA	1.095	1.095	1.096	1.096
Florida				
Fort Lauderdale PMSA	0.988	0.972	1.035	1.057
Miami PMSA	0.988	1.070	1.070	1.057
Tampa-St. Petersburg MSA	0.988	0.972	0.963	0.963
Residual areas	0.988	0.972	0.963	0.963
Georgia				
Atlanta MSA	0.935	0.935	0.982	0.982 *
Residual areas	0.935	0.935	0.905	0.930
Hawaii				
Statewide	1.041	1.041	1.041	1.041
Idaho				
Statewide	0.948	0.948	0.948	0.948
Illinois				
Chicago PMSA	1.054	1.113 *	1.108	1.113 *
Residual areas	1.054	1.004	0.989	1.004
Indiana				
Indianapolis MSA	0.937	0.937	0.954	0.954 *
Residual areas	0.937	0.937	0.933	0.935
Iowa				
Statewide	0.932	0.932	0.932	0.932

State/MSA	Statewide	Large CMSA	Large MSA	All CMSA
Kansas				
Residual areas	0.947	0.947	0.938	0.947
Kentucky				
Residual areas	0.923	0.923	0.920	0.923
Louisiana				
New Orleans MSA	0.957	0.957	1.009	1.010 *
Residual areas	0.957	0.957	0.936	0.941
Maine				
Statewide	0.928	0.928	0.928	0.928
Maryland				
Baltimore MSA	1.043	1.043	1.027	1.029 *
Residual areas	1.043	1.043	0.962	1.035
Massachusetts				
Boston MSA	1.036	1.064 *	1.064	1.064 *
Residual areas	1.036	1.033	0.987	1.021
Michigan				
Detroit PMSA	1.054	1.114 *	1.111	1.114 *
Residual areas	1.054	1.033	1.000	1.024
Minnesota				
Minneapolis-St. Paul MSA	0.973	0.973	1.010	1.010 *
Residual areas	0.973	0.973	0.934	0.954
Mississippi				
Statewide	0.902	0.902	0.902	0.902
Missouri				
Kansas City MSA	0.963	0.963	0.983	0.984 *
St. Louis MSA	0.963	0.963	1.016	1.009 *
Residual areas	0.963	0.963	0.920	0.958
Montana				
Statewide	0.937	0.937	0.937	0.937
Nebraska				
Statewide	0.900	0.900	0.900	0.900
Nevada				
Statewide	1.057	1.057	1.057	1.057
New Hampshire				
Statewide	0.962	0.962	0.962	0.962
New Jersey				
Bergen-Passaic PMSA	1.069	1.077 *	1.100	1.085
Jersey City PMSA	1.069	1.077	1.063	1.085
Middlesex PMSA	1.069	1.065	1.063	1.085 *
Newark PMSA	1.069	1.077 *	1.076	1.085 *
Trenton PMSA	1.069	1.065	1.063	1.047
Residual areas	1.069	1.065	1.063	1.053
New Mexico				
Statewide	0.947	0.947	0.947	0.947
New York				
Buffalo PMSA	1.103	1.020	0.984	0.981
New York City PMSA	1.103	1.178 *	1.179	1.178 *
Nassau-Suffolk PMSA	1.103	1.178 *	1.169	1.178 *
Residual areas	1.103	1.020	0.984	1.025
North Carolina				
Charlotte MSA	0.902	0.902	0.922	0.922 *
Residual areas	0.902	0.902	0.899	0.901
North Dakota				
Statewide	0.921	0.921	0.921	0.921

State/MSA	Statewide	Large CMSA	Large MSA	All CMSA
Ohio				
Cincinatti PMSA	0.969	0.969	0.968	0.972 *
Cleveland PMSA	0.969	0.969	0.996	0.996 *
Columbus MSA	0.969	0.969	0.969	0.969 *
Residual areas	0.969	0.969	0.960	0.963
Oklahoma				
Statewide	0.920	0.920	0.920	0.920
Oregon				
Portland PMSA	0.990	0.990	1.007	1.007 *
Residual areas	0.990	0.990	0.977	0.985
Pennsylvania				
Philadelphia PMSA	1.005	1.072 *	1.063	1.072 *
Pittsburgh PMSA	1.005	0.993	1.000	1.003 *
Residual areas	1.005	0.993	0.965	0.986
Puerto Rico				
Statewide	0.809	0.809	0.809	0.809
Rhode Island				
Providence PMSA	0.989	0.989	0.989	0.991 *
Residual areas	0.989	0.989	0.989	0.987
South Carolina				
Residual areas	0.902	0.902	0.902	0.902
South Dakota				
Statewide	0.898	0.898	0.898	0.898
Tennessee				
Statewide	0.908	0.908	0.908	0.908
Texas				
Dallas PMSA	0.935	0.958 *	0.958	0.958 *
Fort Worth PMSA	0.935	0.920	0.932	0.919
Houston PMSA	0.935	0.981 *	0.980	0.981 *
San Antonio MSA	0.935	0.920	0.929	0.929 *
Residual areas	0.935	0.920	0.913	0.919
Utah				
Salt Lake City MSA	0.962	0.962	0.970	0.970 *
Residual areas	0.962	0.962	0.949	0.956
Vermont				
Statewide	0.919	0.919	0.919	0.919
Virginia				
Norfolk MSA	0.962	0.955	0.953	0.953 *
Residual areas	0.962	0.955	0.915	0.955
Washington				
Seattle PMSA	1.012	1.012	1.034	1.034 *
Residual areas	1.012	1.012	0.998	1.002
West Virginia				
Statewide	0.927	0.927	0.927	0.927
Wisconsin				
Milwaukee PMSA	0.958	0.958	0.995	0.995 *
Residual areas	0.958	0.958	0.941	0.948
Wyoming				
Statewide	0.948	0.948	0.948	0.948

* The GPCI value does not pertain to the entire MSA.

Table V-2

GPCI Values for Core versus Residual Areas under the Large-CMSA Option

CMSA	Core	Residual Areas	Difference (Percentage Points)
New York (NY)	1.178	1.020	15.8%
(NJ)	1.077	1.065	1.2
Los Angeles	1.132	1.088	4.4
Chicago	1.113	1.004	10.9
San Francisco	1.148	1.088	6.0
Philadelphia	1.072	0.993	7.9
Detroit	1.114	1.033	8.1
Boston	1.064	1.033	3.1
Dallas	0.958	0.920	3.8
Washington	1.095	0.955	14.0
Houston	0.981	0.920	6.1
Miami	1.070	0.972	9.8
Average for large CMSAs			7.6
Average for other CMSAs under the all-CMSA option			2.0

Note: CMSAs are ordered by their population size. Averages are not weighted by population.

VI. COMBINING MEDICARE PRICING LOCALITIES TO APPROXIMATE URBAN CORES

Chapter V considered policy options for defining urban cores on the assumption that present localities could be ignored. For administrative feasibility, it may make sense in the short run to build up a configuration of geographic areas that approximates a density-based set of areas by using the existing Medicare pricing localities as building blocks. It would still be possible in the longer run to fully implement a density-based system.

A. Approach

The core definition chosen as the basis for the approximation designates a core for each CMSA that includes the densest county plus other counties with densities above 6,000 persons per square mile.

Since the intent of designating urban cores is to distinguish high-cost areas as measured by the GPCI, we do not include as urban cores areas that meet our definition but do not have higher GPCIs than the residual areas of the state. This rule leads us to exclude the cores of Buffalo, Baltimore, Norfolk, and Hartford. As noted earlier, these four MSAs are all in states that include suburbs of the large metropolitan areas of New York City and Washington, DC. In the case of Hartford, the southwest portion of Connecticut is part of the New York City CMSA, which has the highest GPCI value in the state. Even though Hartford has a higher GPCI value than rural Connecticut, it has a value below the statewide average. Buffalo, Baltimore, and Norfolk are in similar situations.

The only other step is to make a rule for selecting which localities to include in the urban cores. When a locality falls completely within the urban core, it is included. Whenever a locality falls completely outside, it is excluded. A locality that overlaps a core boundary is included in the core only if a majority of its 1980 population is in the core. In states with no urban core, all localities are combined into a single unit.

B. Results

Table VI-1 presents, by state, the number of localities before and after the combination process, and notes, for localities that overlay core boundaries, the percentage of the locality's population in the core. It also notes unusual situations.

Of the 52 states (including the District of Columbia and Puerto Rico), 18 already have statewide localities. These remain unchanged. Combining localities according to our decision rule creates an additional 19 statewide localities. The remaining 15 states have 37 localities under the combination scheme. Three of these combine several localities: 2 in San Francisco, 8 in Los Angeles, and 3 in New York City. The entire combination process yields 74 localities instead of the present 240 localities, a drop of more than two-thirds.

Of the CMSAs with populations over 3 million, cores would be distinguished for 10 out of 11. Boston is the exception, because only 17 percent of the population of the urban Massachusetts locality is in the core. Of the CMSAs with populations between 2 and 3 million, cores would be distinguished for 5 out of 10. Atlanta, St. Louis, Minneapolis, Baltimore, and Tampa are the

exceptions, with percentages of the locality population in the core of 29, 27, 44, 36, and 15, respectively.[38]

Of the CMSAs with populations between 1 and 2 million, cores would be distinguished for 8 out of 16—the exceptions being Denver, Norfolk, Indianapolis, Buffalo, Providence, Charlotte, Hartford, and Salt Lake City. Denver, Providence, and Salt Lake City are already in statewide localities, and Norfolk, Hartford, and Buffalo have a lower GPCI value than the residual area of the state. For both Indianapolis and Charlotte, only 33 of the locality's population is in the core.

Table VI-2 presents the GPCI values before and after combining.[39] It is useful to focus on the localities whose GPCI values change the most under combination. These are presented in Table VI-3.

There are 12 localities with drops in GPCI values of more than 4 percentage points. All but two (Midland and Odessa, TX) include suburbs of large metropolitan areas. The largest drops are for San Mateo and Santa Clara, which would be in the San Francisco core if the density parameter was lowered to 3,500 persons per square mile.

There are 12 localities with increases of more than 4 percentage points. All but one of these (Elko and Ely, Nevada) are in California or Illinois. The locality with the largest increase is northeast rural California. The next 3 largest increases are all in California's Central Valley and each is partially

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38. Note that parts of Philadelphia and Pittsburgh are presently in the same locality, which includes the areas around medical schools. Except for that locality and those in Portland (Oregon) and Phoenix, the combined localities would all be county-based.

39. As noted above, these are the values prepared for the Spring 1991 Notice of Proposed Rule Making; that is, the malpractice GPCI has been remapped and Patient Compensation Funds have been recognized.

rural. Another 4 are Illinois' rural localities; as such, they share the same GPCI value under the status quo and the new system. The localities that experience the largest GPCI increases are concentrated in California and Illinois, because both are geographically large states and have both large metropolitan areas and rural areas.

In general, combining would decrease the GPCI in the suburbs of large metropolitan areas and increase it in rural areas. This is not surprising given that input prices tend to be higher in the suburban rings of large metropolitan areas than in rural areas (Tables IV-1 and IV-2).

C. Policy Choices

The policy choices are well illustrated by Illinois. Combining localities in Illinois results in two localities: Cook County with a GPCI value of 1.113 and the rest of the state with a value of 1.004. Combining localities in Illinois would increase GPCI values in 11 out of 16 localities. The exceptions are Cook County, which is unaffected because it is not combined with any other locality under the new system, and East St. Louis, Peoria, Rockland, and Suburban Chicago. The only decrease of much more than 2 percentage points is in Suburban Chicago, which experiences a drop of 5.4 percentage points.

The disadvantage of combining localities is that the resultant GPCI may not reflect input prices as well as the status quo, which is inherent in any simplification.[40] The advantage of combining localities is simplicity; in Illinois, this means two localities instead of 16.

Another advantage may be argued, albeit outside the input price framework. Even controlling for input prices, the suburbs of large metropolitan areas may

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40. In statistical terms, a combined set of localities has fewer degrees of freedom and presumably explains less variation in the GPCI.

be attractive areas for physicians, suggesting that payment levels need not be higher than in rural areas if the aim is to ensure adequate access to care. Evidence of the relative surplus of physicians in these areas tends to support this notion.[41]

Although a complete discussion is outside the scope of this paper, we do note that the suburban localities whose GPCI values would decrease substantially have few Health Manpower Shortage Areas. For instance, the Suburban Chicago locality—which includes the counties of DuPage, Kane, Lake, and Will—has only one HMSA, whereas Cook County has 14.

D. Further Aggregation

Two of the criteria for defining areas mentioned in Chapter I are conceptual simplicity and tracking differences in cost of practice. Although there is, in general, a tradeoff between these criteria, the tradeoff is minor to the extent that GPCI values differ only slightly. Not distinguishing localities with slight differences in GPCI values could yield simplicity with little loss of accuracy. More concretely, we now consider distinguishing only those localities whose GPCI values exceed those of the residual areas of the state by at least 5 percentage points.

Under this 5-percent rule, there would be 60 localities, a reduction of 14. This would involve 52 states plus the core localities for 8 CMSAs: Los Angeles, San Francisco, Miami, Chicago, New Orleans, Detroit, New York City, and Houston. Seven out of the 11 CMSAs over 3 million population would have

41. It should be noted, however, that much of the published literature on intraurban physician location, although well done, is not focused in such a way to be definitive for our purposes. For instance, Kindig et al. (1987) delineates areas by poverty rates, not by urban core and suburban ring. Knaap and Blohowiak (1989) present multivariate statistics, whereas the policy issue considered here requires univariate statistics.

core localities, the exceptions being Philadelphia, Boston, Dallas, and Washington, D.C. Only 1 out of the remaining 26 CMSAs would have core localities, namely, New Orleans. Nine more states would have statewide localities, for a total of 45 (including D.C. and Puerto Rico).

For the states whose GPCI values are affected by this additional combining, we list their new values:

Arizona	1.005
California	1.102
Missouri	.962
New Jersey	1.069
Ohio	.969
Oregon	.990
Pennsylvania	1.005
Texas	.925
Washington	1.012
Wisconsin	.958

In using the GPCI values to combine localities, there are two considerations to keep in mind. First, when the GPCI is updated using the 1990 Census, GPCI values are likely to change somewhat. The case for the 5-percent rule would be strengthened by the willingness to delineate new cores in the future. Second, at present GPCI values are calculated initially at the MSA level (except for the malpractice GPCI). If they were directly calculated for each core and the residual area of each state, the differentials in GPCI values might be greater.

This chapter has considered ways in which cores could be configured without subdividing localities. One way of combining localities yields 74 localities in contrast to 240 under the current system, and yields only 15 states without statewide localities. Another way—in which only cores with GPCI values at least 5 percentage above that of the residual area of the state--yields 60 localities and only 7 states without statewide localities.

Table VI-1

Combining Localities to Approximate Urban Cores, By State

State	# of localities Before	# of localities After	Commentary
Total	240	74	
Alabama	6	1	
Alaska	1	1	
Arizona	6	2	The Phoenix locality, which is defined in terms of municipalities, remains because it is 100 percent in the core.
Arkansas	1	1	
California	28	5	The 8 L. A. County localities are combined. The San Francisco and Oakland localities are combined; they are 100 percent and 62 percent in the core, respectively. The Sacramento and San Diego localities remain because they are 68 and 95 percent in the core, respectively.
Colorado	1	1	
Connecticut	4	1	The Hartford core is dropped because it has a lower GPCI value than the residual area of the state.
Delaware	1	1	
Dist. of Columbia	1	1	This locality remains a statewide locality and is 33 percent in the core.
Florida	4	2	The Miami locality remains because it is 96 percent in the core. The Tampa-St. Petersburg locality is dropped because it is only 15 percent in the core.
Georgia	4	1	The Atlanta locality is dropped because it is only 29 percent in the core.
Hawaii	1	1	

Table VI-1 (continued)
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State	# of localities Before	# of localities After	Commentary
Idaho	2	1	
Illinois	16	2	The Chicago locality remains because it is 100 percent in the core.
Indiana	3	1	The Indianapolis locality is dropped because it is only 33 percent in the core.
Iowa	8	1	
Kansas	3	1	
Kentucky	3	1	
Louisiana	8	2	The New Orleans locality remains because it is 51 percent in the core.
Maine	3	1	
Maryland	3	1	The Baltimore locality is dropped because it has a lower GPCI value than the residual area of the state. (It is also only 36 percent in the core.)
Massachusetts	2	1	The urban locality is dropped because it is only 17 percent in the core.
Michigan	2	2	The Detroit locality remains because it is 54 percent in the core.
Minnesota	3	1	The Minneapolis-St. Paul locality is dropped because it is only 44 percent in the core.
Mississippi	2	1	
Missouri	7	2	The Kansas City locality remains because it is 100 percent in the core. The St. Louis locality is dropped because it is only 24 percent in the core.
Montana	1	1	
Nebraska	3	1	

State	# of localities Before	# of localities After	Commentary
Nevada	4	1	
New Hampshire	1	1	
New Jersey	3	2	The Northern locality, which includes parts of the New York City core, remains because it is 51 percent in the core.
New Mexico	1	1	
New York	8	2	Manhattan, Queens, and the third New York City locality are 100, 100, and 79 percent in the core, respectively. They are collapsed into one locality. The Buffalo locality is dropped because its GPCI value is lower than the residual area of the state.
North Carolina	2	1	The urban locality (Charlotte) is dropped because it is only 33 in the core.
North Dakota	1	1	
Ohio	15	4	The Cleveland, Cincinnati, and Columbus localities remain because they are 64, 63, and 90 percent in the core, respectively.
Oklahoma	5	1	
Oregon	5	2	The Portland locality, which is defined in terms of municipalities, remains because it is 68 percent in the core.
Pennsylvania	4	2	The locality for large metropolitan areas includes Philadelphia, Pittsburgh, Scranton, Erie, and Williamsport. Another locality includes areas in Philadelphia and Pittsburgh that are near medical schools. These localities are 32 and 100 percent in the core, respectively. Were they combined, they would be 44 percent in the core. Only the medical school locality remains.

Table VI-1 (continued)
Page 4

State	# of localities Before	# of localities After	Commentary
Puerto Rico	1	1	
Rhode Island	1	1	
South Carolina	1	1	
South Dakota	1	1	
Tennessee	1	1	
Texas	32	4	The localities of Houston, Dallas, and San Antonio remain because each is 100 percent in the core.
Utah	1	1	
Vermont	1	1	
Virginia	4	1	The locality that includes Norfolk is dropped because Norfolk has a lower GPCI value than the residual area of the state.
Washington	4	2	The Seattle locality remains because it is 100 percent in the core.
West Virginia	5	1	
Wisconsin	11	2	The Milwaukee locality remains because it is 100 percent in the core.
Wyoming	1	1	

Table VI-2

GPCI Values Under Combined Localities

Carrier-Locality Number	Locality Name	GPCI Values: Status Quo	GPCI Values: Combination	Locality Type, Under Combination
0051005	BIRMINGHAM, AL	0.945	0.927	Statewide
0051004	MOBILE, AL	0.935	0.927	Statewide
0051002	NORTH CENTRAL AL	0.920	0.927	Statewide
0051001	NORTHWEST AL	0.930	0.927	Statewide
0051006	REST OF AL	0.917	0.927	Statewide
0051003	SOUTHEAST AL	0.922	0.927	Statewide
0102001	ALASKA	1.162	1.162	Statewide
0103005	FLAGSTAFF (CITY), AZ	0.969	0.988	Residual
0103001	PHOENIX (CITY), AZ	1.022	1.022	Core
0103007	PRESCOTT (CITY), AZ	0.969	0.988	Residual
0103099	REST OF ARIZONA	0.984	0.988	Residual
0103002	TUCSON (CITY), AZ	1.003	0.988	Residual
0103008	YUMA (CITY), AZ	0.969	0.988	Residual
0052013	ARKANSAS	0.882	0.882	Statewide
0205026	ANAHEIM-SANTA ANA, CA	1.134	1.090	Residual
0054214	BAKERSFIELD, CA	1.056	1.090	Residual
0054211	FRESNO/MADERA, CA	1.028	1.090	Residual
0054213	KINGS/TULARE, CA	1.020	1.090	Residual
0205018	LOS ANGELES, CA (1ST OF 8)	1.132	1.132	Core
0205019	LOS ANGELES, CA (2ND OF 8)	1.132	1.132	Core
0205020	LOS ANGELES, CA (3RD OF 8)	1.132	1.132	Core
0205021	LOS ANGELES, CA (4TH OF 8)	1.132	1.132	Core
0205022	LOS ANGELES, CA (5TH OF 8)	1.132	1.132	Core
0205023	LOS ANGELES, CA (6TH OF 8)	1.132	1.132	Core
0205024	LOS ANGELES, CA (7TH OF 8)	1.132	1.132	Core
0205025	LOS ANGELES, CA (8TH OF 8)	1.132	1.132	Core
0054203	MARIN/NAPA/SOLANO, CA	1.107	1.090	Residual
0054210	MERCED/SURR. CNTYS, CA	1.034	1.090	Residual
0054212	MONTEREY/SANTA CRUZ, CA	1.077	1.090	Residual
0054201	N. COASTAL CNTYS, CA	1.051	1.090	Residual
0054202	NE RURAL CA	1.017	1.090	Residual
0054207	OAKLAND-BERKELEY, CA	1.140	1.146	Core
0054227	RIVERSIDE, CA	1.067	1.090	Residual
0054204	SACRAMENTO/SURR. CNTYS, CA	1.070	1.070	Core
0054215	SAN BERNADINO/E.CENTRAL CA	1.066	1.090	Residual
0205028	SAN DIEGO/IMPERIAL, CA	1.071	1.071	Core
0054205	SAN FRANCISCO, CA	1.163	1.146	Core
0054206	SAN MATEO, CA	1.163	1.090	Residual
0205016	SANTA BARBARA, CA	1.057	1.090	Residual
0054209	SANTA CLARA, CA	1.162	1.090	Residual
0054208	STOCKTON/SURR. CNTYS, CA	1.042	1.090	Residual
0205017	VENTURA, CA	1.092	1.090	Residual
0055001	COLORADO	0.977	0.977	Statewide
1023004	EASTERN CONN.	1.023	1.048	Statewide
1023001	NW AND N.CENTRAL CONN.	1.031	1.048	Statewide
1023003	SOUTH CENTRAL CONN.	1.062	1.048	Statewide
1023002	SW CONNECTICUT	1.098	1.048	Statewide
0057001	DELAWARE	1.002	1.002	Statewide
0058001	D.C. + MD/VA SUBURBS	1.096	1.096	Statewide
0059003	FORT LAUDERDALE, FL	1.010	0.972	Residual
0059004	MIAMI, FL	1.064	1.064	Core
0059002	N/NC FLORIDA CITIES	0.965	0.972	Residual

Table VI-2

GPCI Values Under Combined Localities

Carrier-Locality Number	Locality Name	GPCI Values: Status Quo	GPCI Values: Combination	Locality Type, Under Combination
0059001	REST OF FLORIDA	0.935	0.972	Residual
0104001	ATLANTA, GA	0.982	0.935	Statewide
0104004	REST OF GEORGIA	0.898	0.935	Statewide
0104002	SMALL GA CITIES 02	0.923	0.935	Statewide
0104003	SMALL GA CITIES 03	0.912	0.935	Statewide
0112001	HAWAII	1.041	1.041	Statewide
0513012	NORTH IDAHO	0.941	0.948	Statewide
0513011	SOUTH IDAHO	0.950	0.948	Statewide
0062110	CHAMPAIGN-URBANA, IL	0.956	1.004	Residual
0062116	CHICAGO, IL	1.113	1.113	Core
0062103	DE KALB, IL	0.966	1.004	Residual
0062111	DECATUR, IL	0.968	1.004	Residual
0062112	EAST ST. LOUIS, IL	1.010	1.004	Residual
0062106	KANKAKEE, IL	0.962	1.004	Residual
0062108	NORMAL, IL	0.993	1.004	Residual
0062101	NORTHWEST, IL	0.952	1.004	Residual
0062105	PEORIA, IL	1.025	1.004	Residual
0062107	QUINCY, IL	0.952	1.004	Residual
0062104	ROCK ISLAND, IL	0.988	1.004	Residual
0062102	ROCKFORD, IL	1.020	1.004	Residual
0062113	SOUTHEAST IL	0.952	1.004	Residual
0062114	SOUTHERN IL	0.952	1.004	Residual
0062109	SPRINGFIELD, IL	0.992	1.004	Residual
0062115	SUBURBAN CHICAGO, IL	1.058	1.004	Residual
0063001	METROPOLITAN INDIANA	0.959	0.937	Statewide
0063003	REST OF INDIANA	0.920	0.937	Statewide
0063002	URBAN INDIANA	0.924	0.937	Statewide
0064005	DES MOINES(POLK/WARREN),IA	0.966	0.932	Statewide
0064008	IOWA CITY (CITY LIMITS)	0.946	0.932	Statewide
0064003	NORTH CENTRAL IOWA	0.932	0.932	Statewide
0064002	NORTHEAST IOWA	0.933	0.932	Statewide
0064006	NORTHWEST IOWA	0.920	0.932	Statewide
0064004	S.CEN. IA(EXCL DES MOINES)	0.913	0.932	Statewide
0064001	SE IOWA (EXCL IOWA CITY)	0.941	0.932	Statewide
0064007	SOUTHWEST IOWA	0.924	0.932	Statewide
0074005	KANSAS CITY, KS	0.981	0.947	Statewide
0065001	REST OF KANSAS	0.939	0.947	Statewide
0074004	SUBURBAN KANSAS CITY, KS	0.981	0.947	Statewide
0066001	LEXINGTON & LOUISVILLE, KY	0.939	0.923	Statewide
0066003	REST OF KENTUCKY	0.917	0.923	Statewide
0066002	SM CITIES (CITY LIMITS) KY	0.927	0.923	Statewide
0052807	ALEXANDRIA, LA	0.937	0.939	Residual
0052803	BATON ROUGE, LA	0.971	0.939	Residual
0052806	LAFAYETTE, LA	0.950	0.939	Residual
0052804	LAKE CHARLES, LA	0.938	0.939	Residual
0052805	MONROE, LA	0.930	0.939	Residual
0052801	NEW ORLEANS, LA	1.008	1.008	Core
0052850	REST OF LOUISIANA	0.927	0.939	Residual
0052802	SHREVEPORT, LA	0.967	0.939	Residual
2120002	CENTRAL MAINE	0.914	0.928	Statewide
2120001	NORTHERN MAINE	0.920	0.928	Statewide
2120003	SOUTHERN MAINE	0.952	0.928	Statewide

Table VI-2

GPCI Values Under Combined Localities

Carrier-Locality Number	Locality Name	GPCI Values: Status Quo	GPCI Values: Combination	Locality Type, Under Combination
0069001	BALTIMORE/SURR. CNTYS, MD	1.026	1.019	Statewide
0069003	SOUTH + E. SHORE MD	1.000	1.019	Statewide
0069002	WESTERN MARYLAND	1.000	1.019	Statewide
0070002	MASS.SUBURBS/RURAL(CITIES)	1.019	1.036	Statewide
0070001	MASSACHUSETTS URBAN	1.046	1.036	Statewide
0071001	DETROIT, MI	1.110	1.110	Core
0071002	MICHIGAN, NOT DETROIT	1.005	1.005	Residual
0072002	NORTHERN MINNESOTA	0.944	0.973	Statewide
0072004	SOUTHERN MINNESOTA	0.935	0.973	Statewide
1024001	ST. PAUL-MINNEAPOLIS, MN	1.003	0.973	Statewide
1025001	REST OF MISSISSIPPI	0.894	0.902	Statewide
1025002	URBAN MS (CITY LIMITS)	0.923	0.902	Statewide
0074003	K.C. (JACKSON COUNTY), MO	0.984	0.984	Core
0074002	N. K.C. (CLAY/PLATTE), MO	0.984	0.959	Residual
1126003	REST OF MO	0.922	0.959	Residual
0074006	RURAL NW COUNTIES, MO	0.931	0.959	Residual
1126002	SM. E.CITIES+JEFF.CNTY,MO	0.959	0.959	Residual
0074001	ST. JOSEPH, MO	0.929	0.959	Residual
1126001	ST. LOUIS/LG. E.CITIES, MO	0.996	0.959	Residual
0075101	MONTANA	0.937	0.937	Statewide
0065515	OMAHA + LINCOLN, NE	0.924	0.900	Statewide
0065516	REST OF NEBRASKA	0.882	0.900	Statewide
0065517	URBAN (CNTY POP>25000) NE	0.890	0.900	Statewide
0129003	ELKO & ELY (CITIES), NV	1.010	1.060	Statewide
0129001	LAS VEGAS,ET AL(CITIES),NV	1.061	1.060	Statewide
0129002	RENO, ET AL (CITIES), NV	1.083	1.060	Statewide
0129099	REST OF NEVADA	1.051	1.060	Statewide
0078040	NEW HAMPSHIRE	0.962	0.962	Statewide
0086002	MIDDLE NEW JERSEY	1.055	1.044	Residual
0086001	NORTHERN NEW JERSEY	1.083	1.083	Core
0086003	SOUTHERN NEW JERSEY	1.029	1.044	Residual
0136001	NEW MEXICO	0.947	0.947	Statewide
0080101	BUFFALO/SURR. CNTYS, NY	0.978	0.985	Residual
0080301	MANHATTAN, NY	1.171	1.177	Core
0080103	N. CENTRAL CITIES, NY	0.977	0.985	Residual
0080302	NYC SUBURBS/LONG I., NY	1.177	1.177	Core
0080303	POUGHKPSIE/N.NYC SUBURBS	1.027	0.985	Residual
1433004	QUEENS, NY	1.183	1.177	Core
0080104	REST OF NEW YORK	0.965	0.985	Residual
0080102	ROCHESTER/SURR. CNTYS, NY	1.016	0.985	Residual
0553595	REST OF NORTH CAROLINA	0.898	0.902	Statewide
0553594	URBAN (CITY LIMITS) NC	0.922	0.902	Statewide
0082001	NORTH DAKOTA	0.921	0.921	Statewide
1636001	AKRON, OH	0.969	0.960	Residual
1636002	CINCINATI, OH	0.972	0.972	Core
1636003	CLEVELAND, OH	0.989	0.989	Core
1636004	COLUMBUS, OH	0.969	0.969	Core
1636005	DAYTON, OH	0.969	0.960	Residual
1636009	E. CENTRAL (STEUBENVL), OH	0.946	0.960	Residual
1636007	MANSFIELD, OH	0.942	0.960	Residual
1636013	MARION + SURR. CNTYS., OH	0.944	0.960	Residual
1636006	NORTHWEST (LIMA) OH	0.949	0.960	Residual

Table VI-2

GPCI Values Under Combined Localities

Carrier-Locality Number	Locality Name	GPCI Values Status Quo	GPCI Values Combination	Locality Type, Under Combination
1636014	SCIOTO VALLEY, OH	0.958	0.960	Residual
1636015	SOUTHEAST (OHIO VALLEY) OH	0.944	0.960	Residual
1636008	SPRINGFIELD, OH	0.974	0.960	Residual
1636010	TOLEDO (LUCAS/WOOD), OH	0.989	0.960	Residual
1636012	W. CENTR (LAKE PLAINS), OH	0.941	0.960	Residual
1636011	YOUNGSTOWN, OH	0.963	0.960	Residual
0137001	OK CITY, ET AL (CITIES),OK	0.941	0.920	Statewide
0137099	REST OF OKLAHOMA	0.906	0.920	Statewide
0137004	SM. CITIES (NORTHERN), OK	0.901	0.920	Statewide
0137003	SM. CITIES (SOUTHERN), OK	0.901	0.920	Statewide
0137002	TULSA, ET AL (CITIES), OK	0.942	0.920	Statewide
0138002	EUGENE, ET AL (CITIES), OR	0.983	0.983	Residual
0138001	PORTLAND,ET AL (CITIES),OR	1.007	1.007	Core
0138099	REST OF OREGON	0.984	0.983	Residual
0138003	SALEM, ET AL (CITIES), OR	0.979	0.983	Residual
0138012	SW OR. CITIES(CITY LIMITS)	0.978	0.983	Residual
0086502	LG. PENNSYLVANIA CITIES	1.029	1.000	Residual
0086501	PHILLY/PITT MED SCHS/HOSPS	1.044	1.044	Core
0086504	REST OF PENNSYLVANIA	0.960	1.000	Residual
0086503	SMALL PENNSYLVANIA CITIES	0.967	1.000	Residual
0097320	PUERTO RICO	0.809	0.809	Statewide
0087001	RHODE ISLAND	0.989	0.989	Statewide
0088001	SOUTH CAROLINA	0.902	0.902	Statewide
0082002	SOUTH DAKOTA	0.898	0.898	Statewide
0544035	TENNESSEE	0.908	0.908	Statewide
0090029	ABILENE, TX	0.911	0.919	Residual
0090026	AMARILLO, TX	0.917	0.919	Residual
0090031	AUSTIN, TX	0.942	0.919	Residual
0090020	BEAUMONT, TX	0.953	0.919	Residual
0090009	BRAZORIA, TX	0.968	0.919	Residual
0090010	BROWNSVILLE, TX	0.917	0.919	Residual
0090024	CORPUS CHRISTI, TX	0.937	0.919	Residual
0090011	DALLAS, TX	0.958	0.958	Core
0090012	DENTON, TX	0.958	0.919	Residual
0090014	EL PASO, TX	0.927	0.919	Residual
0090028	FORT WORTH, TX	0.932	0.919	Residual
0090015	GALVESTON, TX	0.950	0.919	Residual
0090016	GRAYSON, TX	0.914	0.919	Residual
0090018	HOUSTON, TX	0.981	0.981	Core
0090033	LAREDO, TX	0.897	0.919	Residual
0090017	LONGVIEW, TX	0.926	0.919	Residual
0090021	LUBBOCK, TX	0.897	0.919	Residual
0090019	MC ALLEN, TX	0.891	0.919	Residual
0090023	MIDLAND, TX	0.984	0.919	Residual
0090002	NORTHEAST RURAL TEXAS	0.909	0.919	Residual
0090013	ODESSA, TX	0.965	0.919	Residual
0090025	ORANGE, TX	0.953	0.919	Residual
0090030	SAN ANGELO, TX	0.908	0.919	Residual
0090007	SAN ANTONIO, TX	0.929	0.929	Core
0090003	SOUTHEAST RURAL TEXAS	0.915	0.919	Residual
0090006	TEMPLE, TX	0.910	0.919	Residual
0090008	TEXARKANA, TX	0.900	0.919	Residual
0090027	TYLER, TX	0.936	0.919	Residual

Table VI-2

GPCI Values Under Combined Localities

Carrier-Locality Number	Locality Name	GPCI Values Status Quo	GPCI Values Combination	Locality Type, Under Combination
0090032	VICTORIA, TX	0.949	0.919	Residual
0090022	WACO, TX	0.910	0.919	Residual
0090004	WESTERN RURAL TEXAS	0.892	0.919	Residual
0090034	WICHITA FALLS, TX	0.914	0.919	Residual
0091009	UTAH	0.962	0.962	Statewide
0078050	VERMONT	0.919	0.919	Statewide
1049004	REST OF VIRGINIA	0.910	0.938	Statewide
1049001	RICHMOND+CHARLOTTESVL, VA	0.938	0.938	Statewide
1049003	SM. TOWN/INDUSTRIAL VA	0.914	0.938	Statewide
1049002	TIDEWATER+N. VA COUNTIES	0.981	0.938	Statewide
0093004	E.CEN+NE WA (EXCL SPOKANE)	0.990	1.002	Residual
0093002	SEATTLE (KING CNTY), WA	1.034	1.034	Core
0093003	SPOKANE+RICHLND(CITIES),WA	1.001	1.002	Residual
0093001	W + SE WA (EXCL SEATTLE)	1.005	1.002	Residual
1651016	CHARLESTON, WV	0.960	0.927	Statewide
1651018	EASTERN VALLEY, WV	0.914	0.927	Statewide
1651019	OHIO RIVER VALLEY, WV	0.914	0.927	Statewide
1651020	SOUTHERN VALLEY, WV	0.911	0.927	Statewide
1651017	WHEELING, WV	0.929	0.927	Statewide
0095113	CENTRAL WISCONSIN	0.920	0.948	Residual
0095140	GREEN BAY, WI (NORTHEAST)	0.940	0.948	Residual
0095154	JANESVILLE, WI (S-CENTRAL)	0.932	0.948	Residual
0095119	LA CROSSE, WI (W-CENTRAL)	0.941	0.948	Residual
0095115	MADISON, WI (DANE COUNTY)	0.966	0.948	Residual
0095146	MILWAUKEE SUBURBS, WI (SE)	0.995	0.948	Residual
0095104	MILWAUKEE, WI	0.995	0.995	Core
0095112	NORTHWEST WISCONSIN	0.929	0.948	Residual
0095160	OSHKOSH, WI (E-CENTRAL)	0.937	0.948	Residual
0095114	SOUTHWEST WISCONSIN	0.920	0.948	Residual
0095136	WAUSAU, WI (N-CENTRAL)	0.930	0.948	Residual
0553021	WYOMING	0.948	0.948	Statewide

Table VI-3

Localities Whose GPCI Values Change by More

than 4 Percentage Points Under Combination

Carrier-Locality Number	Locality Name	GPCI Values		
		Status Quo	Combination	Change
	Losers			
0054206	SAN MATEO, CA	1.163	1.090	-.073
0054209	SANTA CLARA, CA	1.162	1.090	-.072
0090023	MIDLAND, TX	0.984	0.919	-.064
0062115	SUBURBAN CHICAGO, IL	1.058	1.004	-.054
1023002	SW CONNECTICUT	1.098	1.048	-.049
0090009	BRAZORIA, TX	0.968	0.919	-.048
0095146	MILWAUKEE SUBURBS. WI (SE)	0.995	0.948	-.047
0104001	ATLANTA, GA	0.982	0.935	-.046
0090013	ODESSA, TX	0.965	0.919	-.046
0205026	ANAHEIM-SANTA ANA, CA	1.134	1.090	-.044
1049002	TIDEWATER+N. VA COUNTIES	0.981	0.938	-.043
0080303	POUGHKPSIE/N.NYC SUBURBS	1.027	0.985	-.042
	Winners			
0062106	KANKAKEE, IL	0.962	1.004	0.041
0062110	CHAMPAIGN-URBANA, IL	0.956	1.004	0.047
0054208	STOCKTON/SURR. CNTYS, CA	1.042	1.090	0.048
0129003	ELKO & ELY (CITIES), NV	1.010	1.060	0.050
0062107	QUINCY, IL	0.952	1.004	0.052
0062113	SOUTHEAST IL	0.952	1.004	0.052
0062101	NORTHWEST, IL	0.952	1.004	0.052
0062114	SOUTHERN IL	0.952	1.004	0.052
0054210	MERCED/SURR. CNTYS, CA	1.034	1.090	0.056
0054211	FRESNO/MADERA, CA	1.028	1.090	0.062
0054213	KINGS/TULARE, CA	1.020	1.090	0.070
0054202	NE RURAL CA	1.017	1.090	0.072

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APPENDIX 1

ZIP-CODE-BASED URBAN CORES

Chapter II developed urban core options in terms of counties. This appendix develops urban core options in terms of zip codes. Both counties and zip codes have their advantages and disadvantages as building blocks for urban cores.

A major advantage of using counties is that they are very familiar entities to participants in the health care policymaking process. Data on income, population, and other phenomena are often reported by county. Counties are used for Medicare payments to hospitals (MSAs being aggregations of counties), to physicians (many localities are county-based), and to HMOs (each county is a separate payment area).

A weakness of county-based cores is that counties are often internally heterogeneous in terms of density and other characteristics. For example, Middlesex County, Massachusetts includes both Cambridge, which is urban by almost any standard, and Concord, which is clearly suburban. (The county extends far beyond Concord to the New Hampshire border.) Under a county-based strategy, either all or none of the county would be in the core. Similarly, Westchester County, New York includes both densely-populated Yonkers and suburban Scarsdale.

Zip-code-based cores would capture the subtle geographic distinctions ignored by county-based cores. Middlesex County, Massachusetts, for example, is composed of 36 zip codes. By using zip codes as the basic unit and aggregating them, the county can be broken into two areas—urban core and suburban ring.

Although ease of administration is an issue for payment areas defined in terms of zip codes, two facts suggest that administrative problems are solvable. First, existing localities in Mississippi, Pittsburgh, Philadelphia, and Los Angeles are defined in terms of zip codes. Second, Medicare beneficiaries are categorized by county based on their zip code for such purposes as payment to HMOs. (HMSAs are often defined in terms of census tracts, which are much more difficult to administer.)

The primary purpose of this appendix is to develop a more sophisticated but more complex alternative to county-based cores. Its secondary purpose is to investigate and illustrate the internal heterogeneity of counties. This appendix ends by judging whether the use of zip codes is worth the added effort.

A. Methodology

The methodology for zip-code-based cores is analogous to the methodology for county-based cores in Chapter II. In both cases, a population threshold is selected to determine in which CMSAs there will be cores, and then a density threshold is selected to determine which counties or zip codes will be in the core. In addition, an algorithm is defined to simplify the core spatially, which is analogous to the methodology for developing low-density rural areas in Chapter III.

Density threshold. One could define cores using the same population density threshold for all CMSAs, but as Chapter II noted, density varies considerably across CMSAs. Table A1-1 elaborates on this by showing, for instance, that a threshold of 5,000 persons per square mile would include 64 percent of the population of the New York CMSA but only 11 percent of the Dallas CMSA. The CMSAs with high densities are either the older CMSAs--between

Boston and Washington and along the Great Lakes—or those whose growth is constrained by geography—Los Angeles and Miami. The CMSAs with less than a quarter of their population in zip codes with densities above 5,000 are Dallas and Houston, which are Sun Belt cities that have recently grown. A common density threshold for all CMSAs would yield proportionately much larger cores for some CMSAs than others.

Large CMSAs of very different densities are treated analogously to when cores are defined in terms of counties and zip codes. When cores are county-based, at least one county is in each CMSA's core. When cores are zip-code-based, a minimum percent of the population might be in the core. That is, if too small a proportion of a CMSA's population is in zip codes above a density threshold, the threshold for that CMSA is lowered until the minimum percent of the population is included.

To illustrate this approach, we suggest two options:

7,500 persons per square mile or one-fifth of the population, and

5,000 persons per square mile or one-third of the population.

Under the second option, on which we focus, Dallas and Houston would have one-third of their populations included by default, because less than a quarter of their populations are in zip codes with densities above 5,000.

Algorithm. Any CMSA's zip code that exceeds some threshold may not be contiguous. For payment purposes, it is advisable that the core be a single geographic unit,[42] because contiguousness reduces the number of boundaries.[43]

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42. Ideally, the core would be compact. However, devising a compact core is even more difficult than devising a contiguous one.

43. An algorithm for defining cores is not necessary when counties are the basic unit, because density patterns by county are sufficiently regular. But when counties are subdivided into zip codes, the density patterns are less regular. In a sense, some of the stochastic error at the zip code level is canceled out at the county level.

Contiguousness is also conceptually appropriate, because density is a proxy for where a zip code is located in a metropolitan area. Consider a low-density zip code that is surrounded by high-density zip codes. The zip code may be low-density because it includes a park or because residential density is truly lower than surrounding neighborhoods. Still the price of land will be highly influenced by those surrounding neighborhoods. One cannot consider a zip code in isolation, and hence a simplifying algorithm is devised that is similar to the one devised for low-density rural areas.

The algorithm has the following rules:

1. Initially define the core to be all zip codes exceeding the density threshold.

2. Add to this the top five zip codes in terms of employment to capture the Central Business District (CBD). Also add neighboring zip codes that are largely airports, parks, and military bases.

3. Consider two or more high-density zip codes that are contiguous to one another. Where this group is separated from the main block of high-density zip codes by one low-density zip, include in the core both the noncontiguous group and the low-density zip code.

4. Given these modifications, drop all high-density zip codes surrounded by low-density zip codes and water, and include all low-density zip codes surrounded by high-density zip codes and water.

B. Illustrative Results

This algorithm is illustrated by the Boston CMSA, where the density pattern is fairly regular, and the San Francisco CMSA, where the density pattern is often irregular (largely because of topography).

Boston. Map A1-1 shows the density of Boston by zip code; the dark line is the boundary of Suffolk County (Boston). Initially we compare a zip-code-based core with a density threshold of 7,500 to a county-based core with a density threshold of 6,000 (large-CMSA option). The county-based core would include only Suffolk County. Some of the zip codes in Suffolk have densities above 7,500 but not all, and some of the zip codes outside of Suffolk have densities above 7,500. A core consisting only of Suffolk would exclude Cambridge and other dense parts of Middlesex County, which are to the north and west of Suffolk. However, also including Middlesex (large- and medium-CMSA option) would include many low-density areas (i.e., below 5,000).

A zip-code-based core with a threshold of 7,500 would incorporate all the dark areas on the map except for the three noncontiguous zip codes to the east. With a threshold of 5,000, the core would incorporate all the dark and shaded areas on the map. The density threshold of 5,000 yields a compact core. The algorithm serves only to drop three noncontiguous zip codes when the threshold of 7,500 is used. When the threshold is 5,000, the algorithm plays no role.

San Francisco. Maps A1-2 and A1-3 illustrate the algorithm by applying it to the San Francisco CMSA. San Francisco County is at the end of the densely populated peninsula, and Oakland and Berkeley are directly across the bay in Alameda County. The dark lines are the county lines; north of San Francisco County is Marin County and south of it is San Mateo County. As shown in Map A1-2, at a density threshold of 7,500, there is a clear core in San Francisco but the core in the East Bay is less clear. When the density is lowered to 5,000, the core in the East Bay becomes clearer.

To define a core at a threshold of 5,000, a pair of high-density zip codes immediately south of San Francisco are added to the main block. Four high-

density zip codes (Hayward) to the southeast of Oakland are added to the main block in the East Bay. Also added to the core are eight zip codes that are surrounded by high-density zip codes or by water.

Like the Boston map, maps A1-2 and A1-3 illustrate the weakness of county-based cores. The dense sections of Alameda County are all on the western border of the county, although the county stretches far to the east.[44] When cores are defined in terms of counties, either all of Alameda must be in the core or none of it. For the same reason, the maps also illustrate the advantage of weighting density by population instead of by area. Alameda is densely population for the average person, a fact obscured by the conventional measure of density.

C. Conclusion

The above discussion shows that zip codes provide a more exact picture of the distribution of population than do counties. Zip-code-based urban cores presumably would track practice costs better than county-based cores, although it is not clear that the incremental improvement would be large. Administering them appears to be cumbersome but feasible.

But defining an algorithm that would yield plausible configurations would be difficult. And explaining such an algorithm to the many participants in the policymaking process would be quite difficult. For these reasons, we suggest that urban cores not be defined in terms of zip codes.

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44. Note also that the northern most zip code in the East Bay is not in Alameda County.

Table A1-1

Distribution of Population by Density Categories for Large CMSAs

CMSA	Population (in millions)	% of Population Above Density Threshold[a]		
		7,500	5,000	2,500
New York	18.1	54	64	78
Los Angeles	13.8	41	59	75
Chicago	8.2	39	50	73
San Francisco	6.0	25	44	62
Philadelphia	6.0	30	42	58
Detroit	4.6	18	36	62
Boston	4.1	25	34	51
Dallas	3.8	2	11	57
Washington, DC	3.7	20	34	63
Houston	3.6	1	20	49
Miami	3.0	20	55	85

a. Density is calculated by zip code.

Map A1 - 1. Boston MSA

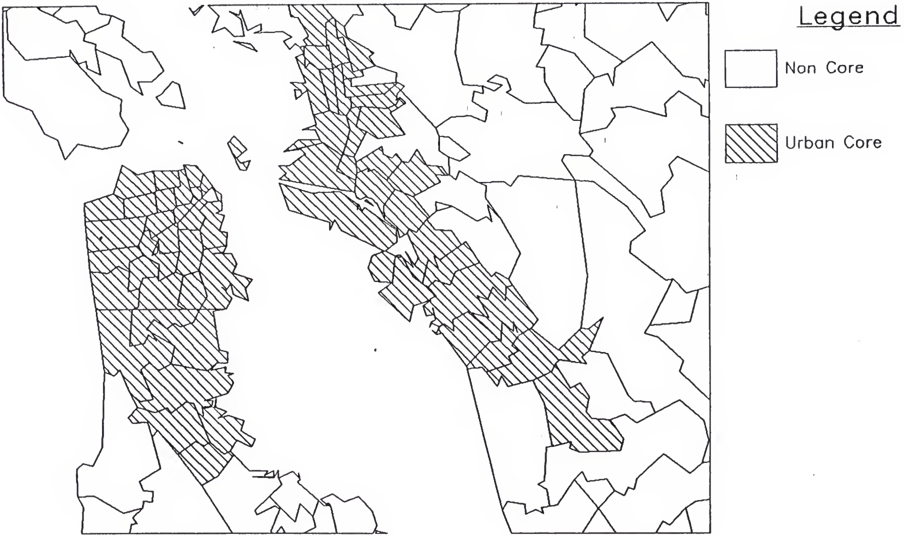
Density by Zip Code

Map A1 - 2. San Francisco CMSA

Density by Zipcode

Map A1 - 3. San Francisco CMSA

Zip Code-Based Core



APPENDIX 2

OTHER RURAL TYPOLOGIES

As discussed in Chapter I, a typology for Medicare payment should:

— maximize the relationship between cost of practice and the index,

— facilitate adjustments related to structural problems,

— result in few boundaries,

— be simple and understandable in concept, and

— be simple to administer (e.g., use a standard algorithm to categorize counties).

In view of the extant urban/rural typologies, one might add that a typology should have only two categories for rural areas. (PPS has only one category.)

Hewitt (1989, ch. 5) provides an excellent description of nine urban/rural typologies. These typologies incorporate one or more of the following characteristics:

— population density,

— urbanization (the percent of the population in urban places),

— population size, and

— adjacency to metropolitan areas.

It should be kept in mind that a typology might be useful for research without being useful for payment purposes.

Of these characteristics, density is the most fundamental measure of ruralness, and hence, will serve as the basic variable here. As Hewitt notes, its primary drawback is that density does not describe how population is distributed within a county. For instance, a county with a community of 2,500 or more residents is probably better able to attract a physician than another

county of the same density without a community with 2,500 or more people. The use of urbanization is an attempt to capture this dimension.

Several typologies use the Census Bureau's definition of the percent urban: percentage of the population in places with 2,500 or more residents. We, however, use only density to define very rural areas for several reasons: (1) Density is useful for defining urban cores; percent urban is not because it does not distinguish between cores and the remainder of urban areas. Using density for our rural delineation is symmetric with our use of density for our urban delineation. (2) Maps of percent urban show far more boundaries than maps of density.[45] (3) Density is conceptually superior to percent urban for certain situations.[46]

Population size is much less useful than density and percent urban, because it is a function of the area of the county. Holding density constant, the larger the county, the larger the population. Finally, adjacency to metropolitan area is discussed in Chapter II.

None of the nine extant typologies of rural areas described by Hewitt meet the criteria set forth above. Each typology has more than two rural categories, such that categories would have to be collapsed in order to be used for payment purposes. Each typology is based on two or three concepts, such that complexity would be a problem. Each appears to result in many boundaries.

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45. More precisely, we compared 25 percent urban and 25 people per square mile. These two definitions capture about the same percentage of physician charges.

46. Consider two counties each with a density of 35 people per square mile. The population of one county is uniformly spread over the county, and the population of the other is concentrated in a town of 2,500 people. Both counties may have one or more physicians in a central location. The only difference might be that residents must travel farther to a physician in one county than the other. The problem of integration of the physician into a health care system may be the same in the counties.

The one strength of these typologies is that they tend to be mechanical in application.

Of the nine typologies, we review only the typology of the National Rural Health Association (NRHA) in detail, as it is the only typology produced by an interest group. It has a fourfold division:

> "adjacent rural areas—counties contiguous to or within MSAs which are very similar to their urban neighbors;
>
> urbanized rural areas—counties with 25,000 or more residents but distant from an MSA;
>
> frontier areas—counties with population densities of less than 6 persons per square mile, which are the most remote areas;
>
> countryside rural areas—the remainder of the country not covered by other rural designations." (Hewitt, 1989, p. 20)

This typology has several weaknesses for payment purposes: (1) it is conceptually complex, using the three concepts of adjacency, urbanization, and density; (2) it is not defined precisely enough for administrative purposes (e.g., similarity to urban neighbors is unclear); and (3) the types are not mutually exclusive (e.g., three of Arizona's counties are both "urbanized rural areas" and "frontier rural", having populations above 25,000 but densities below 6 people per square mile.)

APPENDIX 3

GPCI VALUES UNDER THE ALL-MSA OPTION

Appendix 3. GPCI Values under the All-MSA Option

MSA	MSA Name	All-MSA
40	ABILENE, TX	0.911
60	AGUADILLA, PR	0.784
80	AKRON, OH	0.976
120	ALBANY, GA	0.930
160	ALBANY-SCHENECTADY-TROY, NY	0.990
200	ALBUQUERQUE, NM	0.971
220	ALEXANDRIA, LA	0.937
240	ALLENTOWN-BETHLEHEM, PA-NJ	0.987
280	ALTOONA, PA	0.944
320	AMARILLO, TX	0.917
360	ANAHEIM-SANTA ANA, CA	1.134
380	ANCHORAGE, AK	1.155
400	ANDERSON, IN	0.931
405	ANDERSON, SC	0.899
440	ANN ARBOR, MI	1.035
450	ANNISTON, AL	0.924
460	APPLETON-OSHKOSH-NEENAH, WI	0.952
470	ARECIBO, PR	0.821
480	ASHEVILLE, NC	0.900
500	ATHENS, GA	0.915
520	ATLANTA, GA	0.982
560	ATLANTIC CITY, NJ	1.026
600	AUGUSTA, GA-SC	0.920
620	AURORA-ELGIN, IL	1.027
640	AUSTIN, TX	0.942
680	BAKERSFIELD, CA	1.056
720	BALTIMORE, MD	1.027
733	BANGOR, ME	0.925
760	BATON ROUGE, LA	0.971
780	BATTLE CREEK, MI	1.009
840	BEAUMONT-PORT ARTHUR, TX	0.953
845	BEAVER COUNTY, PA	0.983
860	BELLINGHAM, WA	1.004
870	BENTON HARBOR, MI	0.977
875	BERGEN-PASSAIC, NJ	1.100
880	BILLINGS, MT	0.965
920	BILOXI-GULFPORT, MS	0.929
960	BINGHAMTON, NY	0.962
1000	BIRMINGHAM, AL	0.945
1010	BISMARK, ND	0.947
1020	BLOOMINGTON, IN	0.910
1040	BLOOMINGTON-NORMAL, IL	0.992
1080	BOISE CITY, ID	0.979
1123	BOSTON-LOWELL-BROCKTON-LAWRENCE,MA	1.064
1125	BOULDER-LONGMONT, CO	0.978
1140	BRADENTON, FL	0.966
1145	BRAZORIA, TX	0.968
1150	BREMERTON, WA	1.028
1163	BRIDGEPORT-STAMFORD-NORWALK, CT	1.103
1240	BROWNSVILLE-HARLINGEN, TX	0.917
1260	BRYAN-COLLEGE STATION, TX	0.941
1280	BUFFALO, NY	0.981
1300	BURLINGTON, NC	0.923
1303	BURLINGTON, VT	0.957

Appendix 3. GPCI Values under the All-MSA Option

MSA	MSA Name	All-MSA
1310	CAGUAS, PR	0.804
1320	CANTON, OH	0.956
1350	CASPER, WY	1.006
1360	CEDAR RAPIDS, IA	0.957
1400	CHAMPAIGN-URBANA-RANTOUL, IL	0.959
1440	CHARLESTON, SC	0.918
1480	CHARLESTON, WV	0.979
1520	CHARLOTTE-GASTONIA-ROCK HILL, NC	0.922
1540	CHARLOTTESVILLE, VA	0.937
1560	CHATTANOOGA, TN-GA	0.929
1580	CHEYENNE, WY	0.971
1600	CHICAGO, IL	1.108
1620	CHICO, CA	1.008
1640	CINCINNATI, OH-KY-IN	0.968
1660	CLARKSVILLE-HOPKINSVILLE, TN-KY	0.912
1680	CLEVELAND, OH	0.996
1720	COLORADO SPRINGS, CO	0.947
1740	COLUMBIA, MO	0.946
1760	COLUMBIA, SC	0.923
1800	COLUMBUS, GA-AL	0.907
1840	COLUMBUS, OH	0.969
1880	CORPUS CHRISTI, TX	0.937
1900	CUMBERLAND, MD-W VA	0.936
1920	DALLAS, TX	0.958
1950	DANVILLE, VA	0.912
1960	DAVENPORT-ROCK ISLAND-MOLINE, IL-IA	0.997
2000	DAYTON-SPRINGFIELD, OH	0.974
2020	DAYTONA BEACH, FL	0.967
2040	DECATUR, 1L	0.988
2080	DENVER, CO	1.005
2120	DES MOINES, IA	0.966
2160	DETROIT, MI	1.111
2180	DOTHAN, AL	0.927
2200	DUBUQUE, IA	0.937
2240	DULUTH, MN-WI	0.964
2290	EAU CLAIRE, WI	0.939
2320	EL PASO, TX	0.927
2330	ELKHART-GOSHEN, IN	0.935
2335	ELMIRA, NY	0.964
2340	ENID, OK	0.919
2360	ERIE, PA	0.974
2400	EUGENE-SPRINGFIELD, OR	0.985
2440	EVANSVILLE, IN-KY	0.935
2520	FARGO-MOORHEAD, ND-MN	0.943
2560	FAYETTEVILLE, NC	0.911
2580	FAYETTEVILLE-SPRINGDALE, AR	0.870
2640	FLINT, MI	1.069
2650	FLORENCE, AL	0.939
2655	FLORENCE, SC	0.903
2670	FORT COLLINS-LOVELAND, CO	0.958
2680	FORT LAUDERDALE-HOLLYWOOD, FL	1.035
2700	FORT MYERS-CAPE CORAL, FL	0.980
2710	FORT PIERCE, FL	0.984
2720	FORT SMITH, AR-OK	0.896

Appendix 3. GPCI Values under the All-MSA Option

MSA	MSA Name	All-MSA
2750	FORT WALTON BEACH, FL	0.934
2760	FORT WAYNE, IN	0.945
2800	FORT WORTH-ARLINGTON, TX	0.932
2840	FRESNO, CA	1.030
2880	GADSDEN, AL	0.921
2900	GAINESVILLE, FL	0.951
2920	GALVESTON-TEXAS CITY, TX	0.950
2960	GARY-HAMMOND, IN	1.000
2975	GLENS FALLS, NY	0.964
2985	GRAND FORKS, ND	0.932
3000	GRAND RAPIDS, MI	0.999
3040	GREAT FALLS, MT	0.949
3060	GREELEY, CO	0.937
3080	GREEN BAY, WI	0.956
3120	GREENSBORO-WINSTON-SALEM, NC	0.916
3160	GREENVILLE-SPARTANBURG, SC	0.909
3180	HAGERSTOWN, MD	0.963
3200	HAMILTON-MIDDLETOWN, OH	0.977
3240	HARRISBURG-LEBANON-CARLISE, PA	0.992
3283	HARTFORD-MIDDLETOWN-NEW BRITAIN, CT	1.035
3290	HICKORY, NC	0.881
3320	HONOLULU, HI	1.045
3350	HOUMA-THIBODAUX, LA	0.950
3360	HOUSTON, TX	0.980
3400	HUNTINGTON-ASHLAND, WV-KY-OH	0.945
3440	HUNTSVILLE, AL	0.945
3480	INDIANAPOLIS, IN	0.954
3500	IOWA CITY, IA	0.946
3520	JACKSON, MI	1.013
3560	JACKSON, MS	0.941
3580	JACKSON, TN	0.909
3600	JACKSONVILLE, FL	0.974
3605	JACKSONVILLE, NC	0.899
3620	JANESVILLE-BELOIT, WI	0.952
3640	JERSEY CITY, NJ	1.058
3660	JOHNSON CITY-KINGSPORT, TN-VA	0.910
3680	JOHNSTOWN, PA	0.960
3690	JOLIET, IL	1.044
3710	JOPLIN, MO	0.934
3720	KALAMAZOO, MI	1.008
3740	KANKAKEE, IL	0.972
3760	KANSAS CITY, MO-KS	0.983
3800	KENOSHA, WI	0.990
3810	KILLEEN-TEMPLE, TX	0.910
3840	KNOXVILLE, TN	0.909
3850	KOKOMO, IN	0.955
3870	LA CROSSE, WI	0.939
3880	LAFAYETTE, LA	0.964
3920	LAFAYETTE, IN	0.915
3960	LAKE CHARLES, LA	0.938
3965	LAKE COUNTY, IL	1.058
3980	LAKELAND-WINTER HAVEN, FL	0.949
4000	LANCASTER, PA	0.975
4040	LANSING-EAST LANSING, MI	1.011

Appendix 3. GPCI Values under the All-MSA Option

MSA	MSA Name	All-MSA
4080	LAREDO, TX	0.897
4100	LAS CRUCES, NM	0.923
4120	LAS VEGAS, NV	1.061
4150	LAWRENCE, KS	0.946
4200	LAWTON, OK	0.913
4243	LEWISTON-AUBURN, ME	0.905
4280	LEXINGTON-FAYETTE, KY	0.937
4320	LIMA, OH	0.950
4360	LINCOLN, NE	0.914
4400	LITTLE ROCK-NORTH LITTLE ROCK, AR	0.923
4420	LONGVIEW-MARSHALL, TX	0.926
4440	LORAIN-ELYRIA, OH	0.969
4480	LOS ANGELES-LONG BEACH, CA	1.132
4520	LOUISVILLE, KY-IN	0.939
4600	LUBBOCK, TX	0.897
4640	LYNCHBURG, VA	0.910
4680	MACON-WARNER ROBINS, GA	0.926
4720	MADISON, WI	0.966
4763	MANCHESTER-NASHUA, NH	0.977
4800	MANSFIELD, OH	0.944
4840	MAYAGUEZ, PR	0.797
4880	MCALLEN-EDINBURG-MISSION, TX	0.891
4890	MEDFORD, OR	0.983
4900	MELBOURNE-TITUSVILLE, FL	0.974
4920	MEMPHIS, TN-AR-MS	0.926
4940	MERCED, CA	1.029
5000	MIAMI-HIALEAH, FL	1.070
5015	MIDDLESEX-SOMERSET-HUNTERDON, NJ	1.096
5040	MIDLAND, TX	0.984
5080	MILWAUKEE, WI	0.995
5120	MINNEAPOLIS-ST PAUL, MN-WI	1.010
5160	MOBILE, AL	0.935
5170	MODESTO, CA	1.037
5190	MONMOUTH-OCEAN, NJ	1.060
5200	MONROE, LA	0.930
5240	MONTGOMERY, AL	0.939
5280	MUNCIE, IN	0.916
5320	MUSKEGON, MI	0.985
5345	NAPLES, FL	1.001
5360	NASHVILLE, TN	0.935
5380	NASSAU-SUFFOLK, NY	1.169
5403	NEW BEDFORD-FALL RIVER, MA	0.978
5483	NEW HAVEN-WEST HAVEN, CT	1.033
5523	NEW LONDON-NORWICH, CT-RI	1.026
5560	NEW ORLEANS, LA	1.009
5600	NEW YORK, NY	1.179
5640	NEWARK, NJ	1.076
5700	NIAGARA FALLS, NY	0.981
5720	NORFOLK-VIRGINIA BEACH-NEWPORT, VA	0.953
5775	OAKLAND, CA	1.140
5790	OCALA, FL	0.928
5800	ODESSA, TX	0.965
5880	OKLAHOMA CITY, OK	0.941
5910	OLYMPIA, WA	1.029

Appendix 3. GPCI Values under the All-MSA Option

MSA	MSA Name	All-MSA
5920	OMAHA, NE-IA	0.931
5950	ORANGE COUNTY, NY	1.044
5960	ORLANDO, FL	0.980
5990	OWENSBORO, KY	0.926
6000	OXNARD-VENTURA, CA	1.092
6015	PANAMA CITY, FL	0.936
6020	PARKERSBURG-MARIETTA, WV-OH	0.934
6025	PASCAGOULA, MS	0.928
6080	PENSACOLA, FL	0.950
6120	PEORIA, IL	1.030
6160	PHILADELPHIA, PA-NJ	1.063
6200	PHOENIX, AZ	1.022
6240	PINE BLUFF, AR	0.887
6280	PITTSBURGH, PA	1.000
6323	PITTSFIELD, MA	0.987
6360	PONCE, PR	0.830
6403	PORTLAND, ME	0.975
6440	PORTLAND, OR	1.007
6453	PORTSMOUTH-DOVER-ROCHESTER, NH	0.975
6460	POUGHKEEPSIE, NY	1.047
6483	PROVIDENCE-PAWTUCKET-WOONSOCKET, RI	0.991
6520	PROVO-OREM, UT	0.939
6560	PUEBLO, CO	0.981
6600	RACINE, WI	0.999
6640	RALEIGH-DURHAM, NC	0.933
6660	RAPID CITY, SD	0.917
6680	READING, PA	0.977
6690	REDDING, CA	1.035
6720	RENO, NV	1.083
6740	RICHLAND-KENNEWICK, WA	1.036
6760	RICHMOND-PETERSBURG, VA	0.938
6780	RIVERSIDE-SAN BERNARDINO, CA	1.067
6800	ROANOKE, VA	0.928
6820	ROCHESTER, MN	0.975
6840	ROCHESTER, NY	1.020
6880	ROCKFORD, IL	0.990
6920	SACRAMENTO, CA	1.073
6960	SAGINAW-BAY CITY-MIDLAND, MI	1.025
6980	ST CLOUD, MN	0.943
7000	ST JOSEPH, MO	0.929
7040	ST LOUIS, MO-IL	1.011
7080	SALEM, OR	0.984
7120	SALINAS-SEASIDE-MONTEREY, CA	1.073
7160	SALT LAKE CITY-OGDEN, UT	0.970
7200	SAN ANGELO, TX	0.908
7240	SAN ANTONIO, TX	0.929
7320	SAN DIEGO, CA	1.074
7360	SAN FRANCISCO, CA	1.163
7400	SAN JOSE, CA	1.162
7440	SAN JUAN, PR	0.849
7480	SANTA BARBARA-SANTA MARIA-LOMPO, CA	1.079
7485	SANTA CRUZ, CA	1.091
7490	SANTA FE, NM	0.996
7500	SANTA ROSA-PETALUMA, CA	1.081

Appendix 3. GPCI Values under the All-MSA Option

MSA	MSA Name	All-MSA
7510	SARASOTA, FL	0.988
7520	SAVANNAH, GA	0.931
7560	SCRANTON-WILKES BARRE, PA	0.949
7600	SEATTLE, WA	1.034
7610	SHARON, PA	0.971
7620	SHEBOYGAN, WI	0.942
7640	SHERMAN-DENISON, TX	0.914
7680	SHREVEPORT, LA	0.967
7720	SIOUX CITY, IA-NE	0.941
7760	SIOUX FALLS, SD	0.931
7800	SOUTH BEND-MISHAWAKA, IN	0.926
7840	SPOKANE, WA	0.983
7880	SPRINGFIELD, IL	1.000
7920	SPRINGFIELD, MO	0.940
8003	SPRINGFIELD, MA	0.986
8050	STATE COLLEGE, PA	0.978
8080	STEUBENVILLE-WEIRTON, OH-WV	0.955
8120	STOCKTON, CA	1.048
8160	SYRACUSE, NY	0.978
8200	TACOMA, WA	1.008
8240	TALLAHASSEE, FL	0.950
8280	TAMPA-ST. PETERSBURG, FL	0.963
8320	TERRE HAUTE, IN	0.903
8360	TEXARKANA. TX-TEXARKANA, AR	0.896
8400	TOLEDO, OH	0.989
8440	TOPEKA, KS	0.962
8480	TRENTON, NJ	1.068
8520	TUCSON, AZ	1.003
8560	TULSA, OK	0.950
8600	TUSCALOOSA, AL	0.929
8640	TYLER, TX	0.936
8680	UTICA-ROME, NY	0.951
8720	VALLEJO-FAIRFIELD-NAPA, CA	1.069
8725	VANCOUVER, WA	0.997
8750	VICTORIA, TX	0.949
8760	VINELAND-MILLVILLE-BRIDGETON, NJ	1.000
8780	VISALIA-TULARE-PORTERVILLE, CA	1.022
8800	WACO, TX	0.910
8840	WASHINGTON, D C-MD-VA	1.096
8920	WATERLOO-CEDAR FALLS, IA	0.960
8940	WAUSAU, WI	0.948
8960	WEST PALM BEACH-BOCA RATON, FL	0.993
9000	WHEELING, WV-OH	0.949
9040	WICHITA, KS	0.983
9080	WICHITA FALLS, TX	0.914
9140	WILLIAMSPORT, PA	0.953
9160	WILMINGTON, DE-NJ-MD	1.037
9200	WILMINGTON, NC	0.906
9243	WORCESTER-FITCHBURG-LEOMINSTER, MA	0.997
9260	YAKIMA, WA	0.991
9280	YORK, PA	0.967
9320	YOUNGSTOWN-WARREN, OH	0.968
9340	YUBA CITY. CA	1.017
9901	Alabama	0.907

Appendix 3. GPCI Values under the All-MSA Option

MSA	MSA Name	All-MSA
9902	Alaska	1.168
9904	Arizona	0.969
9905	Arkansas	0.866
9906	California	1.013
9908	Colorado	0.935
9909	Connecticut	0.998
9910	Delaware	0.939
9912	Florida	0.923
9913	Georgia	0.894
9915	Hawaii	1.025
9916	Idaho	0.941
9917	Illinois	0.952
9918	Indiana	0.911
9919	Iowa	0.913
9920	Kansas	0.919
9921	Kentucky	0.907
9922	Louisiana	0.909
9923	Maine	0.918
9924	Maryland	0.954
9925	Massachusetts	0.981
9926	Michigan	0.969
9927	Minnesota	0.926
9928	Mississippi	0.888
9929	Missouri	0.915
9930	Montana	0.930
9931	Nebraska	0.879
9932	Nevada	1.010
9933	New Hampshire	0.940
9935	New Mexico	0.929
9936	New York	0.957
9937	North Carolina	0.885
9938	North Dakota	0.910
9939	Ohio	0.941
9940	Oklahama	0.893
9941	Oregon	0.972
9942	Pennsylvania	0.949
9943	Puerto Rico	0.781
9944	Rhode Island	0.974
9945	South Carolina	0.885
9946	South Dakota	0.888
9947	Tennessee	0.882
9948	Texas	0.890
9949	Utah	0.955
9950	Vermont	0.907
9951	Virginia	0.902
9953	Washington	0.982
9954	West Virginia	0.911
9955	Wisconsin	0.920
9956	Wyoming	0.931

DEPARTMENT OF HEALTH & HUMAN SERVICES

Health Care
Financing Administration

DOCTOR.D 468

Memorandum

Date

From Project Officer Sherry Terrell

A Final Report for Grant/Cooperative Agreement # 17-C-99222/3

Subject Entitled Geographic Payment Areas for the Medicare Fee Schedule: Alternative Approaches

To Director
Office of Operations Support
Thru: Office Director

Attached is the final report from W. Pete Welch and Stephen Zuckerman

The Urban Institute

Brief Overview:

SEE ATTACHED

Disposition of Report:

/X/ Accepted.

Attached for transmission to the Publications and Information Resources Branch are 2 clearly reproducible copies of each report, together with 2 copies of a completed NTIS Form 79 and 1 copy of a completed NTIS Form 272.

/ / Not Accepted - State reasons.

1. NTIS Accession No. (Allow 3 weeks for ordering) PB91-201046		2. Date Sent
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7. CONTACT Name/Phone Number Sherry Terrell (301) 966-6601		Planned Press Release "Locality report"
8. NTIS DOMESTIC PRICE CODES AND CURRENT $ VALUES		
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MEMORANDUM

TO: Sherry Terrell, HCFA-OR

FROM: Stephen Zuckerman, The Urban Institute

DATE: January 22, 1991

SUBJ: Incorporating a Patient Compensation Fund (PCF) Adjustment in the Model Fee Schedule Malpractice GPCI

The malpractice GPCI contained in the Model Fee Schedule was based on a comparison of the costs of a $100,000/$300,000 mature claims-made policy (a base premium) in 1985 and 1986. We did not explicitly recognize that some states have established patient compensation funds (PCFs) that require contributions on the part of physicians. These funds pay for the largest malpractice settlements and are associated with a cap on the physician's liability. Physicians are required to purchase a policy with minimum required limits of coverage and pay a surcharge into the fund to cover the large claims. Since these are costs that physicians cannot avoid, they should be recognized in the MGPCI. However, this must be done in a way that maintains the basic principle that the MGPCI measures geographic differences in the cost of a policy with the same limits of coverage in all areas.

The major conceptual problem related to including the PCF requirements and surcharges into the MGPCI is that the limits of coverage the PCFs provide exceed the limits of the $100,000/$300,000 policy. As argued in our October 1990 revision of the MGPCI, the coverage provided through the PCF is approximately comparable to $1 million/ $3 million coverage. Therefore, if we apply the various PCF adjustments to base premiums from the states having these funds, we must use the $1 million/ $3 million premium in all other states. Otherwise, the geographic differentials reflected in the MGPCI would be meaningless. Fortunately, most of the data needed for this modification of the MGPCI are available.

Even though the underlying premium data in the model fee schedule MGPCI are from 1985 and 1986, we propose to use 1989 data (the most recent information we have) on the costs of PCFs and $1 million/ $3 million coverage. We feel this is appropriate for two basic reasons. First, using 1985 and 1986 data in an MGPCI that will adjust a fee schedule being implemented in 1992 means that we are implicitly assuming that the geographic differentials are reasonably stable over time. Therefore, there is not a real constraint requiring the premium data and adjustment data to come from the same year. Second, physician groups concerned about the omission of PCF costs from the MGPCI will find the use of recent data more credible. In light of the fact that the decision to incorporate this adjustment may be depend on physician reactions to the Model Fee Schedule MGPCI, this needs to be a consideration.

The relevant characteristics of the eight PCF programs being operated in 1989 are displayed in Table 1. Four of these states - Kansas, Pennsylvania, Wisconsin, and New Mexico - mandated physician participation in the funds. The

remaining states operated funds for which participation was optional. Knowing the required basic limits and the surcharge allows us to compute how much the base policy used in the MGPCI must be increased to reflect the PCF costs. The insurer (St. Paul) provides a multiplicative excess coverage factor that converts the base policy premium into a premium for a policy providing the required privately purchased coverage limits. This new premium then is multiplied by the PCF surcharge to arrive at the costs of malpractice coverage in each PCF state. The specific required coverage and PCF surcharge components of the PCF adjustment factors for 1989 are presented in Table 2.

Computing a $1 million/ $3 million premium in the 44 non-PCF states (including the District of Columbia and Puerto Rico) is not quite as straightforward. Although we can directly apply the St. Paul excess coverage factor to the 35 states in which we have St. Paul data (i.e, multiply the base premium by 1.9), there are 9 states whose premium data were derived from other companies or were imputed. These are Alaska, California, Hawaii, New York, Massachusetts, Michigan, Rhode Island, New Hampshire, and Puerto Rico.

Our basic choice is between gathering data on the excess coverage factors in these states or applying the St. Paul factors to these states as well. Earlier analyses of premium data suggest that the St. Paul factors are reasonably close to those that are applicable in other states. Therefore, we make the assumption that St. Paul excess coverage factors can be used to adjust base premiums in all non-PCF states. This implies that each of the premiums in the 44 states need to be multiplied by 1.9 before the MGPCI can be recomputed.

The PCF adjustment factors in the last column of Table 2 exceed 1.9 in four cases and are below 1.9 in four cases. This means that, as a result of the PCF and excess coverage revisions, MGPCI values will rise in Kansas, Pennsylvania, Wisconsin, and Indiana, while falling in the other four PCF states. In two of these latter four states (New Mexico and Louisiana), the PCF provides less coverage than a $1 million/ $3 million policy. This suggests that a downward adjustment in MGPCI values in these states might not be appropriate. In addition, Nebraska and South Carolina MGPCIs would also fall if the PCF factors were applied. Since these are optional programs, there may not be a strong argument for lowering their MGPCIs either.

Based on these considerations, our approach to incorporating the PCF adjustments in the MGPCI is as follows: (1) Multiply each of the remapped MGPCI values in Kansas, Pennsylvania, Wisconsin, and Indiana by the appropriate PCF factor divided by 1.9; this process produces index values that represent the costs of PCF coverage in these four states relative to the national average costs of a $1 million/ $3 million mature claims-made policy. (2) Leave all other remapped MGPCI values unchanged; there is no need to modify these values because the revision of these values amount to multiplying and dividing the MGPCI values by the same number, 1.9. (3) Renormalize the adjusted MGPCI values so that the new index has a population-weighted national average of 1.0. The PCF-adjusted MGPCI, along with the remapped MGPCI, is presented in Table 3 (by locality) and Table 4 (by state).

Based on Table 2, it is not suprising that the biggest change in the MGPCI due to the PCF adjustment occurs in Kansas. Its MGPCI increases from 0.765 to 1.132, an increase of 36.7 percentage points. The only other change that exceeds 10 percentage points is in Wisconsin, whose MGPCI increases from 0.642

to 0.770. Other than in Pennsylvania and Indiana, the only reason that MGPCI values change is the renormalization.

The approach described in this memo seems like the most reasonable method for addressing the PCF issue at this time. While we could have lowered MGPCI values appreciably by applying the PCF adjustment in New Mexico, Nebraska, Louisiana, and South Carolina, the extent of reduction may have been difficult to justify. Moreover, it seems unlikely that this decision will be seriously questioned. A more systematic treatment of the PCF adjustment will be considered when updated premium data become available and can be incorporated in the MGPCI.

sz.pcf adjust

Table 1

States with Patient Compensation Funds (PCFs)
1989

	Required Basic Limits	PCF Coverage Limits	Surcharge to Basic Premium
Mandatory PCFs			
Kansas	200/600	3,000/6,000	125.0
New Mexico	100/300	500/Unlim	33.0
Pennsylvania	200/600	1,200/3,600	58.5
Wisconsin	400/1,000	Unlimited	a
Optional PCFs			
Indiana[b]	100/300	750/Unlim	125.0
Louisiana	100/300	500/Unlim	33.0
Nebraska	200/600	1,000/Unlim	45.0
South Carolina[c]	100/300	Unlimited	40.0

a. Wisconsin has specific premiums by class which it charges for PCF coverage.

b. Indiana claims that occurred before 1/1/87 are only covered up to $500,000.

c. South Carolina's program consists of "dues." To participate in the fund, the physician pays 100% of the Basic Premium the first year, 75% the second year, 50% the third year, and the annual "dues" after the third year.

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Table 2

Components of PCF Adjustment Factor

	Required Coverage Component	PCF Surcharge Component	PCF Adjustment Factor
Mandatory PCFs			
Kansas	1.27	2.25	2.86
New Mexico	1.00	1.33	1.33
Pennsylvania	1.27	1.59	2.02
Wisconsin	1.55	1.48	2.29
Optional PCFs			
Indiana	1.00	2.25	2.25
Louisiana	1.00	1.33	1.33
Nebraska	1.27	1.45	1.84
South Carolina	1.00	1.40	1.40

Note: Required Coverage Component * PCF Surcharge Component = PCF Adjustment Factor

Table 3

Remapped and PCF-Adjusted MGPCI by State and Locality

Carrier Number	Locality Number	Locality Description	Remapped MGPCI	PCF-Adjusted remapped MGPCI
00510	05	BIRMINGHAM, AL	0.833	0.822
00510	04	MOBILE, AL	0.833	0.822
00510	02	NORTH CENTRAL AL	0.833	0.822
00510	01	NORTHWEST AL	0.833	0.822
00510	06	RURAL AL	0.833	0.822
00510	03	SOUTHEAST AL	0.833	0.822
01020	01	ALASKA	1.054	1.040
01030	05	FLAGSTAFF (CITY), AZ	1.269	1.253
01030	01	PHOENIX (CITY), AZ	1.269	1.253
01030	07	PRESCOTT (CITY), AZ	1.269	1.253
01030	99	RURAL ARIZONA	1.269	1.253
01030	02	TUCSON (CITY), AZ	1.269	1.253
01030	08	YUMA (CITY), AZ	1.269	1.253
00520	13	ARKANSAS	0.306	0.302
02050	26	ANAHEIM-SANTA ANA, CA	1.385	1.368
00542	14	BAKERSFIELD, CA	1.385	1.368
00542	11	FRESNO/MADERA, CA	1.385	1.368
00542	13	KINGS/TULARE, CA	1.385	1.368
02050	18	LOS ANGELES, CA (1ST OF 8)	1.385	1.368
02050	19	LOS ANGELES, CA (2ND OF 8)	1.385	1.368
02050	20	LOS ANGELES, CA (3RD OF 8)	1.385	1.368
02050	21	LOS ANGELES, CA (4TH OF 8)	1.385	1.368
02050	22	LOS ANGELES, CA (5TH OF 8)	1.385	1.368
02050	23	LOS ANGELES, CA (6TH OF 8)	1.385	1.368
02050	24	LOS ANGELES, CA (7TH OF 8)	1.385	1.368
02050	25	LOS ANGELES, CA (8TH OF 8)	1.385	1.368
00542	03	MARIN/NAPA/SOLANO, CA	1.385	1.368
00542	10	MERCED/SURR. CNTYS, CA	1.385	1.368
00542	12	MONTEREY/SANTA CRUZ, CA	1.385	1.368
00542	01	N. COASTAL CNTYS, CA	1.385	1.368
00542	02	NE RURAL CA	1.385	1.368
00542	07	OAKLAND-BERKELEY, CA	1.385	1.368
00542	27	RIVERSIDE, CA	1.385	1.368
00542	04	SACRAMENTO/SURR. CNTYS, CA	1.385	1.368
00542	15	SAN BERNADINO/E.CENTRAL CA	1.385	1.368
02050	28	SAN DIEGO/IMPERIAL, CA	1.385	1.368
00542	05	SAN FRANCISCO, CA	1.385	1.368
00542	06	SAN MATEO, CA	1.385	1.368
02050	16	SANTA BARBARA, CA	1.385	1.368
00542	09	SANTA CLARA, CA	1.385	1.368
00542	08	STOCKTON/SURR. CNTYS, CA	1.385	1.368
02050	17	VENTURA, CA	1.385	1.368
00550	01	COLORADO	0.691	0.682
03070	04	EASTERN CONN.	1.047	1.034
03070	01	NW AND N.CENTRAL CONN.	1.036	1.023
03070	03	SOUTH CENTRAL CONN.	1.201	1.185
03070	02	SW CONNECTICUT	1.244	1.228
00570	01	DELAWARE	0.671	0.663
00580	01	D.C. + MD/VA SUBURBS	0.957	0.945
00590	03	FORT LAUDERDALE, FL	1.392	1.374
00590	04	MIAMI, FL	1.659	1.637
00590	02	N/NC FLORIDA CITIES	1.120	1.105

Remapped and PCF-Adjusted MGPCI by State and Locality

Carrier Number	Locality Number	Locality Description	Remapped MGPCI	PCF-Adjusted remapped MGPCI
00590	01	RURAL FLORIDA	1.120	1.105
13110	01	ATLANTA, GA	0.760	0.750
13110	04	RURAL GEORGIA	0.760	0.750
13110	02	SMALL GA CITIES 02	0.760	0.750
13110	03	SMALL GA CITIES 03	0.760	0.750
01120	01	HAWAII	1.037	1.023
05130	12	NORTH IDAHO	0.899	0.887
05130	11	SOUTH IDAHO	0.899	0.887
00621	10	CHAMPAIGN-URBANA, IL	1.150	1.135
00621	16	CHICAGO, IL	1.793	1.770
00621	03	DE KALB, IL	1.150	1.135
00621	11	DECATUR, IL	1.150	1.135
00621	12	EAST ST. LOUIS, IL	1.596	1.576
00621	06	KANKAKEE, IL	1.150	1.135
00621	08	NORMAL, IL	1.150	1.135
00621	01	NORTHWEST, IL	1.150	1.135
00621	05	PEORIA, IL	1.150	1.135
00621	07	QUINCY, IL	1.150	1.135
00621	04	ROCK ISLAND, IL	1.150	1.135
00621	02	ROCKFORD, IL	1.150	1.135
00621	13	SOUTHEAST IL	1.150	1.135
00621	14	SOUTHERN IL	1.150	1.135
00621	09	SPRINGFIELD, IL	1.150	1.135
00621	15	SUBURBAN CHICAGO, IL	1.150	1.135
00630	01	METROPOLITAN INDIANA	0.553	0.645
00630	03	RURAL INDIANA	0.522	0.608
00630	02	URBAN INDIANA	0.522	0.608
00640	05	DES MOINES(POLK/WARREN),IA	0.673	0.664
00640	08	IOWA CITY (CITY LIMITS)	0.673	0.664
00640	03	NORTH CENTRAL IOWA	0.673	0.664
00640	02	NORTHEAST IOWA	0.673	0.664
00640	06	NORTHWEST IOWA	0.673	0.664
00640	04	S.CEN. IA(EXCL DES MOINES)	0.673	0.664
00640	01	SE IOWA (EXCL IOWA CITY)	0.673	0.664
00640	07	SOUTHWEST IOWA	0.673	0.664
00740	05	KANSAS CITY, KA	0.765	1.132
00650	01	RURAL KANSAS	0.765	1.132
00740	04	SUBURBAN KANSAS CITY, KA	0.765	1.132
00660	01	LEXINGTON & LOUISVILLE, KY	0.674	0.665
00660	03	RURAL KENTUCKY	0.674	0.665
00660	02	SM CITIES (CITY LIMITS) KY	0.674	0.665
00528	07	ALEXANDRIA, LA	0.817	0.806
00528	03	BATON ROUGE, LA	0.817	0.806
00528	06	LAFAYETTE, LA	0.817	0.806
00528	04	LAKE CHARLES, LA	0.817	0.806
00528	05	MONROE, LA	0.817	0.806
00528	01	NEW ORLEANS, LA	1.198	1.182
00528	50	RURAL LOUISIANA	0.833	0.822
00528	02	SHREVEPORT, LA	0.817	0.806
21200	02	CENTRAL MAINE	0.724	0.715
21200	01	NORTHERN MAINE	0.724	0.715
21200	03	SOUTHERN MAINE	0.724	0.715
00690	01	BALTIMORE/SURR. CNTYS, MD	0.937	0.925

Remapped and PCF-Adjusted MGPCI by State and Locality

Carrier Number	Locality Number	Locality Description	Remapped MGPCI	PCF-Adjusted remapped MGPCI
00690	03	SOUTH + E. SHORE MD	0.829	0.818
00690	02	WESTERN MARYLAND	0.853	0.842
00700	02	MASS.SUBURBS/RURAL(CITIES)	0.864	0.853
00700	01	MASSACHUSETTS URBAN	0.864	0.853
00710	01	DETROIT, MI	1.755	1.732
00710	02	MICHIGAN, NOT DETROIT	1.209	1.193
00720	02	NORTHERN MINNESOTA	0.756	0.746
00720	04	SOUTHERN MINNESOTA	0.756	0.746
10240	01	ST. PAUL-MINNEAPOLIS, MN	0.756	0.746
10250	01	RURAL MISSISSIPPI	0.658	0.649
10250	02	URBAN MS (CITY LIMITS)	0.658	0.649
00740	03	K.C. (JACKSON COUNTY), MO	1.191	1.176
00740	02	N. K.C. (CLAY/PLATTE), MO	1.191	1.176
11260	03	RURAL (EXCL RURAL NW) MO	1.191	1.176
00740	06	RURAL NW COUNTIES, MO	1.191	1.176
11260	02	SM. E.CITIES+JEFF.CNTY,MO	1.191	1.176
00740	01	ST. JOSEPH, MO	1.191	1.176
11260	01	ST. LOUIS/LG. E.CITIES, MO	1.381	1.363
00751	01	MONTANA	0.726	0.717
00645	01	OMAHA + LINCOLN, NE	0.440	0.435
00645	04	RURAL NEBRASKA	0.440	0.434
00645	03	URBAN (CNTY POP>25000) NE	0.440	0.435
01290	03	ELKO & ELY (CITIES), NV	1.156	1.142
01290	01	LAS VEGAS,ET AL(CITIES),NV	1.156	1.142
01290	02	RENO, ET AL (CITIES), NV	1.156	1.142
01290	99	RURAL NEVADA	1.156	1.142
00780	40	NEW HAMPSHIRE	0.608	0.601
13310	02	MIDDLE NEW JERSEY	1.166	1.151
13310	01	NORTHERN NEW JERSEY	1.166	1.151
13310	03	SOUTHERN NEW JERSEY	1.166	1.151
05320	01	NEW MEXICO	0.775	0.765
00801	01	BUFFALO/SURR. CNTYS, NY	0.974	0.961
00803	01	MANHATTAN, NY	1.665	1.644
00801	03	N. CENTRAL CITIES, NY	0.974	0.961
00803	02	NYC SUBURBS/LONG I., NY	1.951	1.926
00803	03	POUGHKPSIE/N.NYC SUBURBS	1.339	1.322
14330	04	QUEENS, NY	1.881	1.857
00801	02	ROCHESTER/SURR. CNTYS, NY	0.974	0.961
00801	04	RURAL NEW YORK	0.974	0.961
13340	95	RURAL NORTH CAROLINA	0.382	0.377
13340	94	URBAN (CITY LIMITS) NC	0.382	0.377
00820	01	NORTH DAKOTA	0.696	0.687
16360	01	AKRON, OH	0.930	0.918
16360	02	CINCINATI, OH	0.930	0.918
16360	03	CLEVELAND, OH	0.930	0.918
16360	04	COLUMBUS, OH	0.930	0.918
16360	05	DAYTON, OH	0.930	0.918
16360	09	E. CENTRAL (STEUBENVL), OH	0.930	0.918
16360	07	MANSFIELD, OH	0.930	0.918
16360	13	MARION + SURR. CNTYS., OH	0.930	0.918
16360	06	NORTHWEST (LIMA) OH	0.930	0.918
16360	14	SCIOTO VALLEY, OH	0.930	0.918
16360	15	SOUTHEAST (OHIO VALLEY) OH	0.930	0.918

Remapped and PCF-Adjusted MGPCI by State and Locality

Carrier Number	Locality Number	Locality Description	Remapped MGPCI	PCF-Adjusted remapped MGPCI
16360	08	SPRINGFIELD, OH	0.930	0.918
16360	10	TOLEDO (LUCAS/WOOD), OH	0.930	0.918
16360	12	W. CENTR (LAKE PLAINS), OH	0.930	0.918
16360	11	YOUNGSTOWN, OH	0.930	0.918
01370	01	OK CITY, ET AL (CITIES),OK	0.522	0.515
01370	99	RURAL OKLAHOMA	0.522	0.515
01370	04	SM. CITIES (NORTHERN), OK	0.522	0.515
01370	03	SM. CITIES (SOUTHERN), OK	0.522	0.515
01370	02	TULSA, ET AL (CITIES), OK	0.522	0.515
01380	02	EUGENE, ET AL (CITIES), OR	0.962	0.949
01380	01	PORTLAND,ET AL (CITIES),OR	0.962	0.949
01380	99	RURAL OREGON	0.962	0.949
01380	03	SALEM, ET AL (CITIES), OR	0.962	0.949
01380	12	SW OR. CITIES(CITY LIMITS)	0.962	0.949
00865	02	LG. PENNSYLVANIA CITIES	1.367	1.430
00865	01	PHILLY/PITT MED SCHS/HOSPS	1.480	1.549
00865	04	RURAL PENNSYLVANIA	0.940	0.984
00865	03	SMALL PENNSYLVANIA CITIES	0.940	0.984
00870	01	RHODE ISLAND	0.742	0.733
00880	01	SOUTH CAROLINA	0.453	0.447
00820	02	SOUTH DAKOTA	0.695	0.686
05440	35	TENNESSEE	0.411	0.406
00900	29	ABILENE, TX	0.510	0.503
00900	26	AMARILLO, TX	0.510	0.503
00900	31	AUSTIN, TX	0.510	0.503
00900	20	BEAUMONT, TX	0.510	0.503
00900	09	BRAZORIA, TX	0.510	0.503
00900	10	BROWNSVILLE, TX	0.510	0.503
00900	24	CORPUS CHRISTI, TX	0.510	0.503
00900	11	DALLAS, TX	0.510	0.503
00900	12	DENTON, TX	0.510	0.503
00900	14	EL PASO, TX	0.510	0.503
00900	28	FORT WORTH, TX	0.510	0.503
00900	15	GALVESTON, TX	0.510	0.503
00900	16	GRAYSON, TX	0.510	0.503
00900	18	HOUSTON, TX	0.663	0.655
00900	33	LAREDO, TX	0.510	0.503
00900	17	LONGVIEW, TX	0.510	0.503
00900	21	LUBBOCK, TX	0.510	0.503
00900	19	MC ALLEN, TX	0.510	0.503
00900	23	MIDLAND, TX	0.510	0.503
00900	02	NORTHEAST RURAL TEXAS	0.510	0.503
00900	13	ODESSA, TX	0.510	0.503
00900	25	ORANGE, TX	0.510	0.503
00900	30	SAN ANGELO, TX	0.510	0.503
00900	07	SAN ANTONIO, TX	0.510	0.503
00900	03	SOUTHEAST RURAL TEXAS	0.510	0.503
00900	06	TEMPLE, TX	0.510	0.503
00900	08	TEXARKANA, TX	0.510	0.503
00900	27	TYLER, TX	0.510	0.503
00900	32	VICTORIA, TX	0.510	0.503
00900	22	WACO, TX	0.510	0.503
00900	04	WESTERN RURAL TEXAS	0.510	0.503

Remapped and PCF-Adjusted MGPCI by State and Locality

Carrier Number	Locality Number	Locality Description	Remapped MGPCI	PCF-Adjusted remapped MGPCI
00900	34	WICHITA FALLS, TX	0.510	0.503
00910	01	UTAH	0.747	0.737
00780	50	VERMONT	0.538	0.532
10490	01	RICHMOND+CHARLOTTESVL, VA	0.468	0.462
10490	04	RURAL VIRGINIA	0.528	0.521
10490	03	SM. TOWN/INDUSTRIAL VA	0.536	0.529
10490	02	TIDEWATER+N. VA COUNTIES	0.711	0.701
00930	04	E.CEN+NE WA (EXCL SPOKANE)	1.076	1.062
00930	02	SEATTLE (KING CNTY), WA	1.076	1.062
00930	03	SPOKANE+RICHLND(CITIES),WA	1.076	1.062
00930	01	W + SE WA (EXCL SEATTLE)	1.076	1.062
16510	16	CHARLESTON, WV	0.696	0.687
16510	18	EASTERN VALLEY, WV	0.696	0.687
16510	19	OHIO RIVER VALLEY, WV	0.696	0.687
16510	20	SOUTHERN VALLEY, WV	0.696	0.687
16510	17	WHEELING, WV	0.696	0.687
00951	13	CENTRAL WISCONSIN	0.642	0.761
00951	40	GREEN BAY, WI (NORTHEAST)	0.642	0.761
00951	54	JANESVILLE, WI (S-CENTRAL)	0.642	0.761
00951	19	LA CROSSE, WI (W-CENTRAL)	0.642	0.761
00951	15	MADISON, WI (DANE COUNTY)	0.642	0.761
00951	46	MILWAUKEE SUBURBS, WI (SE)	0.642	0.761
00951	04	MILWAUKEE, WI	0.642	0.761
00951	12	NORTHWEST WISCONSIN	0.642	0.761
00951	60	OSHKOSH, WI (E-CENTRAL)	0.642	0.761
00951	14	SOUTHWEST WISCONSIN	0.642	0.761
00951	36	WAUSAU, WI (N-CENTRAL)	0.642	0.761
05530	02	WYOMING	0.648	0.639
00973	01	PUERTO RICO	0.471	0.465

Table 4

Remapped and PCF-Adjusted MGPCI by State

State	State Name	Remapped MGPCI	PCF-Adjusted remapped MGPCI
1	ALABAMA	0.833	0.822
2	ALASKA	1.054	1.040
4	ARIZONA	1.269	1.253
5	ARKANSAS	0.306	0.302
6	CALIFORNIA	1.385	1.368
8	COLORADO	0.691	0.682
9	CONNECTICUT	1.114	1.100
10	DELAWARE	0.671	0.663
11	DIST. OF COLUMBIA	0.932	0.920
12	FLORIDA	1.272	1.255
13	GEORGIA	0.760	0.750
15	HAWAII	1.037	1.023
16	IDAHO	0.899	0.887
17	ILLINOIS	1.475	1.456
18	INDIANA	0.535	0.623
19	IOWA	0.673	0.664
20	KANSAS	0.765	1.132
21	KENTUCKY	0.674	0.665
22	LOUISIANA	0.923	0.911
23	MAINE	0.724	0.715
24	MARYLAND	0.931	0.919
25	MASSACHUSETTS	0.864	0.853
26	MICHIGAN	1.463	1.444
27	MINNESOTA	0.756	0.746
28	MISSISSIPPI	0.658	0.649
29	MISSOURI	1.261	1.245
30	MONTANA	0.726	0.717
31	NEBRASKA	0.440	0.434
32	NEVADA	1.156	1.142
33	NEW HAMPSHIRE	0.608	0.601
34	NEW JERSEY	1.166	1.151
35	NEW MEXICO	0.775	0.765
36	NEW YORK	1.564	1.544
37	NORTH CAROLINA	0.382	0.377
38	NORTH DAKOTA	0.696	0.687
39	OHIO	0.930	0.918
40	OKLAHOMA	0.522	0.515
41	OREGON	0.962	0.949
42	PENNSYLVANIA	1.210	1.266
43	PUERTO RICO	0.471	0.465
44	RHODE ISLAND	0.742	0.733
45	SOUTH CAROLINA	0.453	0.447
46	SOUTH DAKOTA	0.695	0.686
47	TENNESSEE	0.411	0.406
48	TEXAS	0.536	0.529
49	UTAH	0.747	0.737
50	VERMONT	0.538	0.532
51	VIRGINIA	0.639	0.630
53	WASHINGTON	1.076	1.062
54	WEST VIRGINIA	0.696	0.687
55	WISCONSIN	0.642	0.761
56	WYOMING	0.648	0.639

MEMORANDUM

TO: Sherry Terrell,
HCFA-OR

FROM: Stephen Zuckerman and Stephen Norton,
The Urban Institute

DATE: May 20, 1991

SUBJ: Documentation of the Computer Programs and Data Files Used to Create the Geographic Practice Cost Indices (GPCIs)

As requested, we have prepared detailed documentation of the computer programs and data files used to create the GPCIs that will be used in the Medicare Fee Schedule. We have combined a large number of programs that were run at separate times into five separate programs relating to the major steps in the development of the indices. This memo also documents the programs used to crosswalk the GPCIs from their original MSA basis to either a locality, carrier, or state basis.

The programming process is summarized in Attachment A. Development of the Malpractice GPCIs and the other GPCIs are presented separately. All of the raw data used to create the non-malpractice GPCIs are contained in DATA1. These data include 1980 Census median earnings for the various professional specialty occupations used in the physician's own time proxy and the HUD fair market rents for 1987. The employee wage proxy, proxempi, was created by CHER and is taken as given in this documentation (A memo prepared by CHER is included as Attachment B). Using this data file, PROGRAM1 creates indices for physician's own time and office rents at the MSA level. Analogously, PROGRAM2 uses state-level malpractice premium data from 1985 and 1986 (MALP85 and MALP86) to compute MSA-level MGPCIs that reflect intrastate differences in malpractice costs.

Given these basic building blocks, PROGRAM3 merges MALP and DATA2 into a single MSA-level data file that contains all of the data and indices used in the creation of the GPCIs that appeared in the Model Fee Schedule (GPCI1). The data in this file is then mapped to the "county" level by PROGRAM4. "County" appears in quotes because some of the observations relate to counties that were divided in order to facilitate the mapping of the indices to Medicare pricing localities. This was necessary in North Carolina, Mississippi, Arizona, and Connecticut.

The "county-level" file, GPCI2, is the input to the three crosswalk programs that are required to create indices at the locality-, carrier-, and state-level. These programs are LOCALXW, CARRXW, and STATEXW, respectively. A fourth crosswalk program, MSAXW, was also developed to re-create MSA-level indices from the "county" values for completeness. Another important aspect of the crosswalk programs is that they append the data for Puerto Rico. As you are aware indices for Puerto Rico were developed after the original data files

were constructed (see memo of 10/25/89) because of delays in getting Census data for this area.

PROGRAM5 modifies the malpractice indices in GPCI2 to reflect the PCF adjustments and the corrections in the mapping algorithm described in our February 1991 report. All of the other indices on GPCI2 appear on GPCI3 unchanged. The crosswalk programs designed to map the data in GPCI3 to indices based in the relevant geographic areas are LOCALXW1, CARRXW1, STATE1, and MSAXW1. This second set of crosswalk programs will yield indices that are consistent with those that will appear in the Spring 1991 Notice of Proposed Rule Making for the Fee Schedule.

PROGRAM1 through PROGRAM5, as well as the crosswalk programs, are quite detailed. In order to make these programs easier to follow, we have inserted comments throughout the programs that describe our approach to the various steps required to construct the indices. We followed this approach because we felt that direct annotation of the program code would be easier for potential users to refer to than a separate discussion that could have appeared in this memo.

All of the programs and data files referred to in this memo are included on the enclosed tape. Hard copy of each program and a SAS Proc Contents of each data file are contained in Attachment C. Some aspects of the code we are sending are specific to the computer system at the Urban Institute (e.g., the SAS library names) and will require modification to be run at HCFA. Please contact us if you have any problems using these tapes or if you have any further questions about these materials.

Attachment A

GPCI Documentation